Flora of Chiapas

PUBLISHED BY THE CALIFORNIA ACADEMY OF SCIENCES

Part 2

PTERIDOPHYTES: *Alan R. Smith*

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Curator, Department of Botany
California Academy of Sciences

List of Families for *Flora of Chiapas* With Number of Species Known at Present

(those listed in *Flora of Guatemala* are in parentheses)

Ferns & Allies	658 (650)
Conifers	34 (28)
Acanthaceae	113 (133)
Aceraceae	2 (2)
Actinidiaceae	18 (12)
Agavaceae	7 (5)
Aizoaceae	7 (7)
Amaranthaceae	30 (40)
Anacardiaceae	22 (18)
Annonaceae	30 (31)
Apiaceae	59 (50)
Apocynaceae	65 (70)
Aquifoliaceae	18 (10)
Araceae	100 (65)
Araliaceae	20 (22)
Arecaceae	58 (83)
Aristolochiaceae	17 (19)
Asclepiadaceae	77 (90)
Asteraceae	600 (611)
Balanophoraceae	1 (1)
Balsaminaceae	3 (2)
Basellaceae	5 (4)
Bataceae	1
Begoniaceae	45 (34)
Berberidaceae	9 (7)
Betulaceae	5 (6)
Bignoniaceae	50 (66)
Bixaceae	1 (1)
Bombacaceae	20 (14)
Boraginaceae	70 (65)
Brassicaceae	31 (34)
Bromeliaceae	126 (127)
Brunelliaceae	1 (1)
Burmanniaceae	5 (6)
Burseraceae	15 (12)
Butomaceae	1 (2)
Buxaceae	1 (2)
Cactaceae	42 (30)
Callitrichaceae	3 (2)
Campanulaceae	26 (33)
Cannaceae	5 (6)
Capparaceae	31 (28)
Caprifoliaceae	24 (18)
Caricaceae	9 (3)
Caryophyllaceae	36 (36)
Casuarinaceae	2 (1)
Celastraceae	52 (27)
Ceratophyllaceae	1 (1)
Chenopodiaceae	5 (5)
Chloranthaceae	1 (1)
Cistaceae	4 (5)
Clethraceae	10 (8)
Clusiaceae	29 (34)
Cochlospermaceae	2 (2)
Combretaceae	17 (14)
Commelinaceae	64 (40)
Connaraceae	3 (5)
Convolvulaceae	122 (144)
Coriariaceae	1 (1)
Cornaceae	2 (2)
Crassulaceae	31 (17)
Cucurbitaceae	56 (52)
Cunoniaceae	2 (2)
Cyclanthaceae	7 (5)
Cyperaceae	199 (185)
Cyrillaceae	(1)
Dichapetalaceae	3 (3)
Dilleniaceae	8 (8)
Dioscoreaceae	31 (29)
Droseraceae	3 (1)
Ebenaceae	9 (11)
Elatinaceae	1
Elaeocarpaceae	8 (7)
Ericaceae	44 (36)
Eriocaulaceae	2 (13)
Erythroxylaceae	8 (7)
Euphorbiaceae	256 (212)
Fabaceae	703 (553)
Fagaceae	39 (26)
Flacourtiaceae	40 (31)
Garryaceae	2 (2)
Gentianaceae	35 (36)
Geraniaceae	13 (7)
Gesneriaceae	59 (57)
Haemodoraceae	1 (1)
Haloragaceae	3 (3)
Hamamelidaceae	2 (3)
Hernandiaceae	1 (3)
Hippocastanaceae	1 (1)
Hippocrateaceae	12 (5)
Hydrocharitaceae	1 (3)
Hydrophyllaceae	10 (7)
Icacinaceae	6 (4)
Iridaceae	29 (22)
Juglandaceae	4 (5)
Juncaceae	16 (10)
Krameriaceae	2 (2)
Lacistemaceae	1 (1)
Lamiaceae	121 (100)
Lauraceae	96 (55)
Lecythidaceae	1 (2)
Lemnaceae	8 (7)
Lennoaceae	2 (1)
Lentibulariaceae	9 (17)
Liliaceae s. l.	124 (100)
Linaceae	5 (4)
Loasaceae	9 (6)
Loganiaceae	29 (24)
Loranthaceae	43 (42)
Lythraceae	47 (34)
Magnoliaceae	5 (3)
Malpighiaceae	56 (49)
Malvaceae	125 (95)
Marantaceae	18 (14)
Marcgraviaceae	6 (10)
Martyniaceae	1 (2)
Mayacaceae	1 (1)
Melastomataceae	141 (154)
Meliaceae	37 (32)
Meliosmaceae	3 (4)
Menispermaceae	11 (11)
Monimiaceae	7 (3)
Monotropaceae	2 (2)
Moraceae	68 (64)
Moringaceae	1 (1)
Musaceae	21 (13)
Myricaceae	3 (3)
Myristicaceae	2 (5)
Myrsinaceae	61 (61)
Myrtaceae	85 (96)
Najadaceae	1 (2)
Nyctaginaceae	31 (24)
Nyssaceae	1
Nymphaeaceae	4 (5)
Ochnaceae	10 (7)
Olacaceae	10 (5)
Oleaceae	18 (12)
Onagraceae	44 (46)
Opiliaceae	3 (1)
Orchidaceae	514 (527)
Orobanchaceae	1 (1)
Oxalidaceae	23 (17)
Papaveraceae	9 (9)
Passifloraceae	42 (42)
Pedaliaceae	1 (1)
Phytolaccaceae	11 (13)
Piperaceae	106 (158)
Plantaginaceae	5 (4)
Platanaceae	1 (1)
Plumbaginaceae	3 (3)
Poaceae	461 (455)
Podostemaceae	3 (4)
Polemoniaceae	10 (10)
Polygalaceae	30 (34)
Polygonaceae	44 (55)
Pontederiaceae	8 (8)
Portulacaceae	7 (9)
Potamogetonaceae	8 (7)
Primulaceae	7 (5)
Proteaceae	2 (3)
Punicaceae	1 (1)
Pyrolaceae	5 (4)
Quiinaceae	(1)
Rafflesiaceae	4 (3)
Ranunculaceae	21 (18)
Resedaceae	(2)
Rhamnaceae	25 (22)
Rhizophoraceae	2 (2)
Rosaceae	78 (70)
Rubiaceae	280 (298)
Rutaceae	42 (41)
Salicaceae	8 (6)
Sapindaceae	64 (63)
Sapotaceae	41 (33)
Saxifragaceae	11 (8)
Scrophulariaceae	86 (95)
Simaroubaceae	14 (13)
Solanaceae	150 (172)
Staphyleaceae	4 (4)
Sterculiaceae	34 (28)
Styracaceae	4 (3)
Symplocaceae	11 (10)
Tamaricaceae	2
Theaceae	15 (8)
Theophrastaceae	4 (6)
Thymelaeaceae	8 (6)
Tiliaceae	41 (25)
Tovariaceae	1 (1)
Trigoniaceae	2 (2)
Triuridaceae	(3)
Tropaeolaceae	2 (2)
Turneraceae	10 (7)
Typhaceae	3 (2)
Ulmaceae	10 (10)
Urticaceae	47 (55)
Valerianaceae	14 (12)
Verbenaceae	90 (70)
Violaceae	29 (23)
Vitaceae	19 (15)
Vochysiaceae	2 (2)
Winteraceae	1 (1)
Xyridaceae	2 (3)
Zingiberaceae	14 (14)
Zygophyllaceae	7 (5)
Total:	8248; 7749

Flora of Chiapas

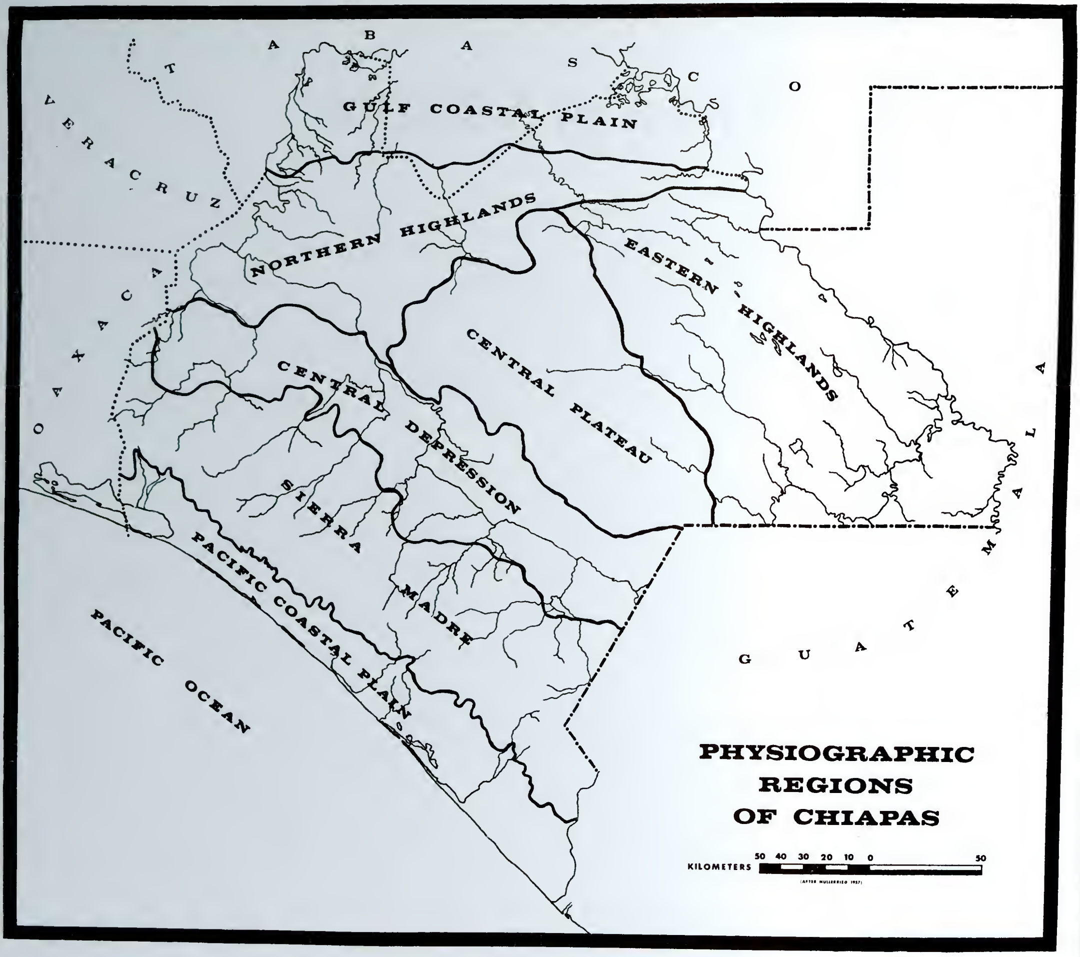

FIGURE 1. Physiographic regions of Chiapas, Mexico (after Müllerried, 1957).

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NOT AN EXCHANGE ITEM

PTERIDOPHYTES

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> *You have frequently expressed surprise at my great predilection for ferns . . . . "How can a man," you used to exclaim, "take so lively an interest in a family of plants so deficient in variety, and whose exterior has so little to recommend them!"*
>
> —translation from Kurt Sprengel (1804)

We can forgive Sprengel's imaginary friend, who must surely have been unaware of the diversity of tropical ferns. Even a casual observer should notice the variety of ferns in wet tropical forests, where ferns account for five to ten percent of the vascular plant species.

At the invitation of Dennis E. Breedlove in 1971, I began work on the ferns and fern allies of the state of Chiapas, Mexico. Chiapas lies at the southernmost end of Mexico between Guatemala and the Isthmus of Tehuantepec and is situated so as to contain elements from the drier habitats to the north and west and also from the wetter tropical and montane forests of Central America to the south. As a bonus, there is also a floristic intrusion from the Antilles. The pteridophytes of Chiapas account for about 7–8 percent of about 8000 vascular plant species known from the state, more than in any single flowering plant family except Compositae and Leguminosae.

Presently, there is a paucity of floristic treatments of ferns in the American tropics. Early treatments of Mexican ferns are very incomplete and/or the nomenclature does not reflect current ideas on the classification of ferns (Martens and Galeotti, 1842; Liebmann, 1849; Fournier, 1872; Rovirosa, 1909; Conzatti, 1939). A few more recent works for restricted areas in Mexico contain only a small percentage of species found in Chiapas (Matuda, 1956; Knobloch and Correll, 1962). The best "modern" treatments for tropical American ferns are for Peru (but this is less than one-fourth completed; Tryon, 1964), Guatemala (also less than one-fourth completed but with work in progress; Stolze, 1976), Surinam (Kramer, 1978), and the Lesser Antilles (Proctor, 1977). Work is currently progressing on treatments of the pteridophytes of Costa Rica, Panama, and Chocó, Colombia (by David Lellinger), and Oaxaca, Mexico (by John Mickel).

No flora, especially one for a tropical area, can be expected to be complete, but sufficient collecting has now been done in Chiapas to suggest that a high percentage of the species of pteridophytes that occur there have been collected (I estimate 95 percent). Altogether, there are 99 genera of ferns known from the state, with possibly two more to be expected; five genera of fern allies are also known. The total number of pteridophyte species known from the state is 609 (563 ferns and 46 fern allies); this number includes three or four naturalized species of ferns. At the end of the treatment of each genus, those species known from adjacent regions (especially Oaxaca, Veracruz, Guatemala, and Belize) but not yet recorded from Chiapas are mentioned. There are fewer than 15 species of pteridophytes known to me that have been found both to the north and south of Chiapas but have not been collected in Chiapas.

Several classifications of ferns have been proposed in the last 40 years, among them ones by Christensen (1938), Ching (1940), Holttum (1947, 1949), Copeland (1947), Alston (1956), and Crabbe et al. (1975). Some additional phylogenetic schemes have been presented, e.g., by Nayar (1970), Holttum (1973), and Mickel (1973). A full historical review of fern classification was given by Pichi Sermolli (1973; see also references therein). While there is substantial agreement on limits of many of the large natural groups (families) of some of the presumed primitive ferns (e.g., Osmundaceae, Gleicheniaceae), there is relatively little agreement on the circumscription of families of the much greater number of higher leptosporangiate ferns (i.e., Polypodiaceae s.l.). Although I have preferences for some of the recent classifications over others, I believe that it serves no practical purpose to adopt any one system that may well be out-of-date in a few years. For this reason, and also because some of the technical characters for defining families require observations that are best made under a compound microscope (e.g., whether the annulus is oblique or vertical), I have departed from usual procedure and have omitted descriptions and keys to families. Instead, I have written a single key to all genera of Chiapas ferns. I believe that the user will arrive more reliably at the proper genus using this key than through a family key followed by a genus key.

In the key to genera, I have tried to make allowances for aberrant members (for example, a simple-bladed species in an otherwise pinnate-bladed genus) so that there are multiple entries for some genera. I have also tried to allow for cases where observation is difficult or where misinterpretation is possible or probable. In general, I have used only characters that can be observed with the unaided eye or with up to 30-power magnification. When characters requiring use of the compound microscope are used (e.g., spore shape), they are added as supplemental (and usually highly diagnostic) characters in making a choice in a dichotomy.

All genera of ferns are arranged alphabetically. With one exception, species within a genus are arranged alphabetically; *Thelypteris* contains a key to subgenera, with the subgenera alphabetical and the species within each subgenus alphabetical. Other large genera (e.g., *Polypodium, Grammitis,* and *Trichomanes*) might also have been handled in this way; however, there is less unanimity among pteridologists re circumscription of subgenera in these genera.

Only minimal generic synonymies have been listed; those wanting more complete synonymies should consult Copeland (1947) and Crabbe et al. (1975). In circumscription of genera I have mostly adopted the system of Crabbe et al. (1975), recognizing only their "first-order" genera. Genera of the "second-order" (their indented genera) that I have recognized are a few cheilanthoids (*Adiantopsis, Cheiloplecton, Mildella*), one gymnogrammoid (*Gymnopteris*), one polypodioid (*Microgramma*), four cyatheoids (*Trichipteris, Nephelea, Alsophila, Sphaeropteris*), one asplenioid (*Phyllitis*), and two aspidioids (*Plecosorus, Phanerophlebia*). Some of the segregates of *Thelypteris, Grammitis, Hymenophyllum,* and *Trichomanes* are no doubt just as well founded as some of the "second-order" genera that I recognize, but they have not gained widespread acceptance and there is no compelling reason to espouse them here. I have subdivided these "sensu lato" genera into subgenera/sections in the keys and given alternative binomials in synonymy for those wishing a more finely drawn circumscription.

References following the generic description and discussion have often provided the basis for the treatment of Chiapas species. Within a generic treatment, these references are cited by author and date. A few additional citations by author and date refer to general works (e.g., Copeland, 1947) included in the Literature Cited section following this introduction.

With regard to species circumscription, I find the criteria discussed by Cronquist (in Cronquist et al., 1972) to be eminently sensible. Barriers to interbreeding lead to observed discontinuities between species. Fern species, perhaps more than flowering plant species, seem to be reproductively isolated (i.e., hybrids between species are sterile); however, there are few experimental or field studies that confirm this. As a practical matter, one can rarely test for intersterility among plants or populations, so we accord species rank to groups of organisms that are morphologically "distinct." The degree of morphological discontinuity necessary before one recognizes a species is, of course, a subjective matter. As Cronquist put it, "most taxonomists will not now accord specific rank to vascular plants of ordinary size which cannot be distinguished by sharp eyes with only minimal accessory equipment. One should not have to do an *Arbeit* to put a name on his specimen."

In general, I believe that I have followed a relatively conservative course in recognizing a minimum number of species. With additional monographic studies, the number is likely to increase rather than diminish. Where I have perceived taxonomic problems that require additional collections or study, I have generally preferred to discuss them, leaving it to future investigators to describe new taxa or otherwise unravel taxonomic problems. In a few cases, I have departed from existing treatments in hope of stimulating further research (see, for example, the treatment of the *Asplenium auritum* complex). In nearly all cases, I have followed the taxonomy of recent monographers. Two species are included in the Chiapas flora solely on the basis of literature reports: *Doryopteris pedata* and *Polybotrya cervina*; for all other species cited from the state, I have seen one or more specimens from Chiapas.

The following additional comments are relevant to the format and presentation of treatments of individual species:

SYNONYMY.—In citation of synonymy, I have used the format recommended by Leenhouts (1968:40), whereby all names based on the same type (nomenclatural or homotypic synonyms) are included in a paragraph, chronologically following the accepted name. Taxonomic (heterotypic) synonyms, if any, are listed in subsequent paragraphs. Typification of each basionym, insofar as it could be determined, is given at the end of each paragraph. In general, I have cited only those synonyms that have been applied relatively recently (since 1900) to Chiapas specimens or those that have gained wide acceptance for the species in other parts of its range. I have also tried to cite all basionyms that have Mexican or northern Central American (north of Costa Rica) specimens as their type. However, my search has not been exhaustive in this last regard, especially where names at infraspecific rank are concerned.

Whenever possible, I have tried to see types of basionyms cited. I have also verified the existence and identity of Linnaeus and Willdenow types by consulting the microfilm and microfiche editions of these herbaria at the University of California, Berkeley. Typification of many Linnaean species is problematic and must await more critical study. Proctor (1977) has recently lectotypified many Linnaean fern names. Jackson's (1912) index and Savage's (1945) catalogue are indispensible in establishing the types of Linnaean names.

In general, I have not made lectotypifications of names, preferring to leave that to monographers. In cases where I have seen all type material and where that material is uniform (particularly with Liebmann's species), I have explicitly chosen a lectotype. If others have lectotypified names, I have tried to so indicate.

LITERATURE CITATION.—Citation of periodic literature follows the abbreviations in Botanico-Periodicum-Huntianum (B-P-H) (Lawrence et al., 1968). For journals not entered in B-P-H and also for non-periodicals, I have generally used the abbreviations in *Index Filicum* and *Supplements* (Christensen, 1905–1906, 1913, 1917, 1934; Pichi Sermolli et collab., 1965).

Dates of publication follow Stafleu (1967) and Stafleu and Cowan (1976). Entries in the form "'1801' [1802]" give the title page date in quotation marks and the actual publication date in brackets.

ILLUSTRATIONS.—Illustrations of 90 genera and 106 species have been included. In choosing species for illustration, priority has been given to those taxa never before illustrated. Of the 14 genera not illustrated, 11 are represented by single species in Chiapas and the other three are each represented by two species; all 17 of these species are well illustrated in other publications. Specimens used as basis for illustrations are all Breedlove collections (number cited) at DS unless otherwise indicated.

I have also cited earlier works where helpful drawings or photographs of the various taxa will be found but have avoided references to illustrations that I regard as poor or misleading or of no help in identification. Approximately 50 percent of Chiapas pteridophytes have been acceptably illustrated in floras or monographs. The floras of southern Mexico (Rovirosa, 1909), Guatemala (Stolze, 1976), Nicaragua (Shimek, 1897), Venezuela (Vareschi, 1969), Peru (Tryon, 1964), Chihuahua (Knobloch and Correll, 1962), and Estado de México (Matuda, 1956) contain illustrations that will be especially useful in identification of Chiapas species. Forthcoming treatments of the pteridophytes of Oaxaca (by John Mickel) and Costa Rica, Panama, and Chocó, Colombia (by David Lellinger), will also contain illustrations of many Chiapas species.

DESCRIPTIONS.—The descriptions of taxa are intended to be diagnostic rather than complete. Where available, I have relied heavily on descriptions in recent monographs, expanding the descriptions where necessary to accommodate the variation seen in Chiapas specimens. For frequently collected Chiapas species (more than 10 collections), descriptions have been drawn primarily from Chiapas specimens, unless there has been some reason to suspect that Chiapas material is atypical. Where Chiapas collections are few, I have based descriptions on material from throughout the range of the species (primarily from UC).

No glossary is provided; one should consult a botanical dictionary for definitions. A good pteridophyte glossary can be found in Knobloch and Correll (1962).

Chromosome numbers, if known, are given at the end of the descriptions. In general, I have not given counts based on Old World collections except where they represent the sole count(s) for the species. In all cases these numbers are to be taken as citation of counts previously published, i.e., no new counts are reported herein. There are few surveys of chromosome numbers for tropical American pteridophytes. The most comprehensive of these was undertaken on Jamaican pteridophytes by Walker (1966, 1973). There are smaller samplings of chromosome numbers for ferns from Costa Rica (Gómez, 1971), Galápagos (Jarrett et al., 1968), Mexico (Mickel et al., 1966; Smith and Mickel, 1977), and for American Polypodiaceae (Evans, 1963) and Thelypteridaceae (Smith, 1971). All counts from Chiapas material have as vouchers Breedlove (with Smith) collections at DS. Altogether, there are chromosome reports for about 280 species (50 percent) of ferns known from Chiapas; very few counts have been made on the fern allies.

HABITAT AND VEGETATIONAL FORMATION.—Insofar as it is known, I have included a brief statement of the habitat of each species. This information has been gleaned from specimen labels, literature, and also personal observations. The statement of vegetational formation follows the nomenclature of Breedlove (1973) and the general introduction to this flora (Breedlove, 1981). The greatest numbers of pteridophytes occur in middle-elevation rain forests (Pine-Oak-Liquidambar Forest, Lower Montane and Montane rain forests in Breedlove's terminology), but significant numbers also occur in Evergreen Cloud Forest and Tropical Rain Forest. Unfortunately, vast areas of these two last-named vegetational formations have been destroyed. Additional fern habitats are in the seasonal vegetational formations, particularly Seasonal Evergreen Forest, Tropical Deciduous Forest, and Pine-Oak Forest. Relatively few pteridophytes occur in the various treeless formations (Bunch Grassland, Evergreen Cloud Scrub, Herbaceous Marsh, Coastal Strand, Second-growth and Successional Forest) or in wetland forest formations (Swamp and Lowland Riparian forests).

PHYTOGEOGRAPHY, ELEVATION, AND DISTRIBUTION.—For phytogeographic purposes, Chiapas can be reasonably divided into seven physiographic regions (following Mülleried, 1957; Breedlove, 1973, 1981; Fig. 1). The greatest numbers of pteridophytes occur in those regions that contain vegetational formations favoring ferns, i.e., the Northern and Eastern highlands, Central Plateau, and Sierra Madre. I have indicated the phytogeographic region(s) where each species occurs in Chiapas. A rough indication of abundance in the various regions is also given, e.g., "rare" (1 or 2 collections), "uncommon" (3–8 collections), "common" (more than 8 collections). The phrase "scattered" or "widely scattered" is to be interpreted as meaning nowhere common but found in several phytogeographic regions, often widely distributed beyond Chiapas borders. Any rating system of this sort is obviously a function of the intensity of collecting. When unexplored areas of the state can be collected, no doubt some species thought to be rare or uncommon will be found to be relatively common. Most parts of Chiapas have now been reasonably well sampled (Breedlove, 1981:fig. 20), but large areas in the Eastern Highlands and also the Sierra Madre are rather inaccessible and uncollected.

Elevational distribution can often be extremely useful in identification, since many species are confined to a relatively narrow elevational range. The stated elevations apply to Chiapas collections only and not to the elevational range (usually broader) of the species in other parts of its distribution.

Except for very wide-ranging and common species, I have attempted to give a complete account of the Mexican distribution of each species, listing each state where a species has been collected (for geographical abbreviations, see Appendix). The extra-Mexican distribution,* insofar as I have been able to verify it, has been compiled from specimens in various herbaria, especially UC (but many distributional records based on specimens seen at BM, K, NY, and US). In general, I have not relied on literature records for distribution, since such records often contain inaccuracies or are based on different circumscriptions of the species concerned. Exceptions are made for distributions of species treated in recent monographs.

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* "Malesia" (abbreviated Males.) has been used to denote the area in Southeast Asia that includes the Federated States of Malaysia, Borneo, Philippine Archipelago, Indonesia, New Guinea, and nearby islands (for discussion, see C. G. G. J. van Steenis, ed., Flora Malesiana, Series 1, Spermatophytes 1:xi–xiii. 1950. Djakarta: Nordhoff-Kolff N. V.).

A more complete account of the phytogeography of Chiapas pteridophytes is being written for publication elsewhere (Smith, in prep.).

SPECIMEN CITATIONS.—The foundation of floristic works, especially those that deal with vegetation from poorly known areas, is the assemblage of specimens gathered from the area treated. Therefore, I believe that it is important to list those collections on which the floristic treatment is based. Restrictions of space, time, and money command that this list be as concise as possible, so I list only collector (abbreviations in section on history of collecting), collection number, and herbarium. All collections made by Breedlove or by Breedlove and collaborators (see section on history of collecting) are listed by number only and are in DS, now housed in CAS (duplicates distributed to MEXU, NY, MO, US, F). Unless otherwise indicated, I have seen all specimens cited (excluding types, which are identified by an exclamation mark if seen).

HISTORY OF PTERIDOPHYTE COLLECTING IN CHIAPAS

The earliest collections of Chiapas pteridophytes were made in 1838–1841 by two Belgians, Jean Jules Linden, a botanist, accompanied by Auguste Ghiesbreght, a naturalist. Their collections were largely confined to the Northern Highlands across the border from Tabasco (Fig. 1). Linden collected perhaps 25–30 specimens of ferns in Chiapas but made much more extensive collections in Tabasco in the vicinity of Teapa (Rovirosa, 1909; Hemsley, 1885–86, 1887). The extent of Ghiesbreght's fern collecting during this period is not known, but the collections were probably few, since Ghiesbreght was responsible primarily for collecting zoological specimens.

Ghiesbreght returned to Tabasco in 1855, whereupon he began intensive exploration and collection in the area around Teapa, Tabasco, and again across the border into the Northern Highlands of Chiapas (Hemsley, 1887; Rovirosa, 1889). In 1862, he established residence in San Cristóbal Las Casas, Chiapas, and spent the next eight years traveling and collecting in the state, primarily throughout the Central Plateau and Central Depression (Fig. 1; precise localities are not known). He amassed about 250 collections of pteridophytes in the period 1864–1870; an enumeration of these is given by Hall (1873). Additional citations of Ghiesbreght collections are in Hemsley (1885–86) and Rovirosa (1909). Although he lived in San Cristóbal until his death in 1893, he apparently made no collections of ferns after 1870.

From 1883 to 1894, José Rovirosa made numerous collecting trips into Chiapas from Tabasco, probably following much the same general itinerary as had Linden and Ghiesbreght. During these trips he made perhaps 200 collections of ferns from the Northern Highlands (Fig. 1). With these and even more extensive collections from the vicinity of Teapa, Tabasco, as a basis, Rovirosa published an account of the ferns of southern Mexico (Rovirosa, 1909), which is useful, although very incomplete because of the limited areas collected. In this flora, Rovirosa described several new species based on his own collections and those of a friend, Martinez, who collected in the vicinity of the Río Lacanja.

In the early 1900's, German Münch collected extensively in the Central Plateau, especially in the vicinity of San Cristóbal Las Casas, where he resided. Münch's collections of pteridophytes total perhaps 300, most of which were sent to Hermann Christ in Basel for identification and distribution. From these collections, Christ described many species, several of them honoring Münch, e.g., *Polypodium* [*Pleopeltis*] *munchii, Aspidium* [*Polystichum*] *munchii.* That Münch collected in very interesting and relatively inaccessible areas is attested by the fact that several of the species typified by Münch collections are still known only from their types.

Carl Albert Purpus, one of the more illustrious collectors of Mexican plants, visited Chiapas on six occasions between 1913 and 1930, collecting a total of about 150–175 pteridophytes. His itinerary has recently been charted by Sousa S. (1969), and includes collection sites in the Northern Highlands, the Pacific Coastal Plain, and the Sierra Madre (Fig. 1). Purpus did not specialize in collecting ferns as did Rovirosa and Münch, but his specimens of ferns are among the finest. His collections up until 1925 were identified largely by T. S. Brandegee. After Brandegee's death, Purpus sent his collections to the United States National Herbarium in Washington, D.C., for identification.

During the 1930's and 1940's, Eizi Matuda intensively explored Distritos Soconusco and Mariscal in southern Chiapas, making about 250 collections of pteridophytes (Matuda, 1950a, 1950b). These two districts exhibit tremendous elevational gradients, from sea level to over 4000 meters on Volcán Tacaná on the Guatemala border, and are consequently very rich in number of species. Matuda collected about 110 species of pteridophytes from these two districts but left many more unsampled. In the genus *Elaphoglossum* alone, I have collected eight species from a single mountain peak in Dist. Mariscal, whereas Matuda records only a single species of *Elaphoglossum* for both districts.

In 1964, Dennis E. Breedlove began collecting vascular plants in Chiapas as part of a study of the ethnobotany of various Mayan tribes in the Chiapas highlands (see general introduction by Breedlove, 1981). During the 1960's he collected about 300–400 numbers of pteridophytes, largely from the Central Plateau. From 1971–1973 Breedlove collected about 3000 additional pteridophytes from throughout the state. These specimens (DS, housed in CAS) nearly tripled the total number of collections of ferns and fern allies from the state and form the basis for the treatment presented here. Major sets of duplicates of pteridophytes are in MEXU, NY, MO, F, and US. Some of the collections were made with collaborators (see general introduction for summary of collection numbers, their dates of collection, and collaborators).

The following list includes most of the botanists who have collected pteridophytes in Chiapas. The abbreviations in brackets following the collectors' names are used in the lists of specimen citations. Collection sites, approximate number of pteridophytes collected, repository(ies), and year(s) of collection are given for each entry.

ALAVA, REINO [A]—Central Plateau (vicinity of San Cristóbal Las Casas, Amatenango, Jola, south of Chanal); ca. 40 nos.; UC (set 1), duplicates at DS, GH, MEXU; 1957.

ANDERLE, R. F. [An]—Cerro Prusia; fewer than 5 nos.; MEXU, US; 1965.

ARREQUÍN S., M. L. [Ar]—Munic. Ostuacán; fewer than 5 nos.; DS; 1969.

BECERRA, MARCOS E. [Be]—Cerro La Montaña, Tuxtla; fewer than 5 nos.; MEXU; 1918.

BOSSÉ, G. [Bo]—between Santa Rita and San Salvador; fewer than 5 nos.; US; 1926–1927.

BEUTELSPACHEN, C. R. [Bt]—18 km north of Ocozocoautla; fewer than 5 nos.; MEXU; 1968.

CARLSON, MARGERY C. [MC]—mostly Lagos de Monte Bello, also a few from Zontehuitz, Cerro Huitepec; ca. 65 nos. (some cited in Carlson, 1952, 1954); EAP, F, MEXU, US; 1949, 1952.

CHAVELAS P., J., GONZALEZ L., AND PEREZ J. [Ch]—between Pichucalco and Juárez; fewer than 5 nos.; MEXU.

CLARKE, OSCAR F. [C]—vicinity of Pueblo Nuevo Solistahuacán; ca. 10 nos.; DS; 1967.

COLLINS, GUY N., AND CONRAD B. DOYLE [C&D]—numerous localities in Northern Highlands and Central Plateau; ca. 65 nos.; US; 1907.

DRESSLER, ROBERT L. [Dr]—vicinity of Laguna Ocotal Grande; ca. 40 nos.; GH, MEXU, US, a few in UC; 1954.

FISHER, G. L. [Fi]—Sierra Madre (near Cacahuatán) and Pacific Coastal Plain (Tapachula); ca. 10 nos.; DS, F, MO, NY, US; 1935.

GHIESBREGHT, AUGUSTE [G]—evidently many localities in Northern Highlands, Central Plateau, Central Depression ?, but few with precise locality data; ca. 250–300 nos. (see Hall, 1873, for list); YU (set 1), partial sets at BM, BR, GH, K, L, LE, NY, P, US; 1864–1870.

GILLY, CHARLES L., AND E. HERNANDEZ XOLOCOTZI [G&H]—Munic. Pichucalco; fewer than 5 nos.; MICH, MSC, NY; 1944.

GITTENS, B. T. [Gi]—mostly vicinity of Pueblo Nuevo Solistahuacán and a few other localities in Northern Highlands; ca. 15 nos. seen; NY; 1967.

GÓMEZ-POMPA, ARTURO [G-P]—Pueblo Nuevo Solistahuacán, Arcua; fewer than 5 nos.; MEXU; 1960, 1962.

HALE, M., AND T. SODERSTROM [H&S]—several localities along or near Mex. Hwy. 190 (e.g., El Sumidero, north of Berriozábal, Lagos de Monte Bello); ca. 15 nos.; US; 1960.

HOWARD, M. J. [Ho]—near San Cristóbal Las Casas; fewer than 5 nos.; US.

JUZEPCZUK, SERGEI V. [J]—drier parts of Northern Highlands; fewer than 5 nos.; US; 1926.

KING, ROBERT M. [RMK]—along Mexican Hwy. 190, especially in Central Plateau; ca. 12 nos.; DS, TEX, UC, US (set 1); 1960.

LANGMAN, IDA K. [Lm]—Cerro Brujo, Cerro Mactumatza; fewer than 5 nos.; PH; 1949.

LATHROP, EARL W. [EL]—vicinity of Pueblo Nuevo Solistahuacán; fewer than 5 nos.; DS; 1970.

LAUGHLIN, ROBERT M. [La]—mostly Munic. Zinacantán, Munic. San Cristóbal Las Casas, and a few other municipios in Central Plateau; ca. 40 nos.; DS; 1966.

LINDEN, JEAN J. [Li]—Northern Highlands (especially vicinity of Pueblo Nuevo Solistahuacán) and Central Plateau (vicinity of San Cristóbal Las Casas); ca. 40 nos.; BR, K, P; 1838–1841.

LITTLE, ELBERT L., JR., AND AARON J. SHARP [L&S]—Cerro Hueytepec and vicinity of San Cristóbal Las Casas; ca. 55 nos.; US (set 1), UC; 1945.

LUNDELL, CYRUS L. [Lu]—Río Lacantun; fewer than 5 nos.; US.

MARCKS AND MARCKS [M&M]—3 mi. NE of Pichucalco, Palenque; ca. 5 nos.; WIS (set 1).

MARIN [Ma]—Pueblo Nuevo Solistahuacán; ca. 70 nos.; World Life Research Institute, DS, RSA; 1960–1975.

Martinez Chable, L. [Ma]—Río Lacanja, Dept. Chilon, Sierra de Moyos; ca. 25 nos. (cited in Rovirosa, 1909); no specimens found; 1894.

Matuda, Eizi [EM]—numerous localities in southern Sierra Madre and Pacific Coastal Plain, also a few collections near Palenque; ca. 250 nos. (some cited in Matuda, 1950a, 1950b); MEXU (set 1), second and third sets at MICH and LL, partial sets in DS, F, K, NY, UC, US; mostly between 1936 and 1949.

MacDougall, Thomas [Mc]—Sierra Madre (El Triunfo, Finca Prusia to Mapastepec, Volcán Tacaná); fewer than 5 nos.; MEXU, US; 1954.

Mell, Clayton D. [Me]—Río Leche, Las Tinebles; ca. 6 nos.; US; 1933.

Mickel, John T. [JTM]—between San Cristóbal Las Casas and Zontehuitz; ca. 35 nos.; NY, US; 1963.

Miranda, Faustino [Mi]—numerous localities in Northern Highlands, Sierra Madre, Central Depression; ca. 15 nos.; MEXU; 1949–1954.

Montes de Oca, Rafael [Mt]—Sierra de Soconusco; ca. 20 nos.; MEXU (bound exsicc.); 1884.

Morley, Thomas [Mo]—Pajón [Pacific Coastal Plain]; fewer than 5 nos.; UC, US; 1946.

Münch, German [GM]—numerous localities in Northern Highlands and Central Plateau; ca. 200 nos., ca. 100 additional unnumbered collections; P (set 1), DS (a nearly complete set, probably containing some collections not in P), very incomplete set at US (containing mostly fragments from DS); 1900–1907.

Purpus, Carl A. [P]—several localities in Sierra Madre, Pacific Coastal Plain, and Northern Highlands (cited by Sousa S., 1969); ca. 150–175 nos.; UC (set 1 prior to 1925), US (set 1 after 1925), incomplete sets at BM, F, GH, MO, NY; 1913, 1914, 1923, 1925, 1926, 1930.

Raven, Peter, and Dennis E. Breedlove [R&B]—several localities, but mostly from vicinity of Pueblo Nuevo Solistahuacán; ca. 20 nos.; DS (set 1), US; 1965.

Reeder, John R., and C. G. Reeder [R&R]—several localities along Mex. Hwy. 190 in Central Plateau; ca. 5 nos.; MEXU; 1953.

Riba, Ramon [Ri]—Tapachula (Finca La Libertad); fewer than 5 nos.; MEXU; 1960.

Roe, K., E. Roe, and S. Mori [R&R&M]—several localities in Northern Highlands (vicinity of Pueblo Nuevo Solistahuacán, Mal Paso Rd.), Central Depression, Central Plateau; ca. 30 nos.; MICH, US; 1965.

Rovirosa, José N. [R]—numerous localities in Northern Highlands and Central Plateau (cited in Rovirosa, 1909); ca. 125 numbered collections and ca. 60 unnumbered collections (unnumbered collections not found); PH (apparently the most complete extant set), small and very incomplete sets in GH, K, MEXU, NY, US; 1883–1894.

Rzedowski, Jerzy [Rz]—Cerro al norte de Ocozocoautla; fewer than 5 nos.; ENCB, LP.

Seler, G. Eduard [Se]—Palenque; fewer than 5 nos.; GH, US.

Seler, Caecilie, and E. Seler [S&S]—vicinity of Palenque, Cerro de Tonalá; 5–10 nos. (extensive collections of flowering plants from state); B, CAS, GH, US; 1896, 1911.

Sharp, Aaron, J. [S]—Lagos de Monte Bello, near Huistan, Cerro Huitepec, ca. 5 nos. (see Sharp, 1945); MEXU, US; 1945.

Smith, C. Earle, and F. Ruiz Mora [S&M]—near Oaxaca-Chiapas border; fewer than 5 nos.; MEXU, US; 1957.

Sohns, Ernest R. [So]—San Quintín, Laguna Miramar; ca. 25 nos.; MEXU, US; 1955.

Thorne, Robert, and E. Lathrop [T&L]—Jitotol Ridge (especially vicinity of Pueblo Nuevo Solistahuacán); ca. 75 nos.; DS, RSA; 1970, 1971.

Tillett, Stephen S. [Ti]—vicinity of Pueblo Nuevo Solistahuacán; ca. 5 nos.; DS, US; 1963.

Ton, Alush S. [T]—mostly Munic. Tenejapa, a few from Cerro Huitepec; ca. 55 nos.; DS (set 1), US; 1964–1968.

Webster, Grady, et al. [We]—scattered localities in Central Plateau; fewer than 5 nos.; MEXU; 1962, 1972.

Weatherwax, Paul [W]—Chicarras; fewer than 5 nos.; UC; 1945.

Xolocotzi, Efraím H., and Aaron J. Sharp [X&S]—Sierra de Soconusco (Finca Liquidambar to El Triunfo) and Pacific Coastal Plain (vicinity of Mapastepec); ca. 25 nos.; MEXU, US; 1945.

Zuill, H. [Z]—3 km nw of Pueblo Nuevo Solistahuacán; ca. 25 nos.; DS; 1970.

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LITERATURE CITED

ALSTON, A. H. G. 1956. The subdivision of the Polypodiaceae. Taxon 5:23–25.

BREEDLOVE, D. E. 1973. The phytogeography and vegetation of Chiapas (Mexico). Pp. 149–165 *in* A. Graham (ed.), Vegetation and vegetational history of northern Latin America. New York: Elsevier Scientific Publishing Co.

———. 1981. Introduction to the Flora of Chiapas. Flora of Chiapas pt. 1:1–35. San Francisco: California Academy of Sciences.

CARLSON, M. C. 1952. Plant collecting in southern Mexico and Honduras. Yearb. Amer. Philos. Soc. 1952:169–171.

———. 1954. Floral elements of the pine-oak-*Liquidambar* forest of Montebello, Chiapas, Mexico. Bull. Torrey Bot. Club 81:387–399.

CHING, R. C. 1940. On natural classification of the family "Polypodiaceae." Sunyatsenia 5:201–268.

CHRISTENSEN, C. 1905–1906. Index Filicum. Copenhagen: Hagerup.

———. 1913. Index Filicum, Supplementum (1906–1912). Copenhagen: Hagerup.

———. 1917. Index Filicum, Supplément préliminaire pour les années 1913, 1914, 1915, 1916. Copenhagen: Bogtrykkeri.

———. 1934. Index Filicum. Supplementum tertium pro annis 1917–1933. Copenhagen: Hagerup.

———. 1938. Filicinae. Pp. 522–550 *in* F. Verdoorn (ed.), Manual of Pteridology. The Hague: Nijhoff.

CONZATTI, C. 1939. Flora taxonómica mexicana. Pteridofitas o helechos. 1(2):i–xv, 1–167. Oaxaca de Juárez: La Esfera.

COPELAND, E. B. 1947. Genera filicum; the genera of ferns. i–xvi, 1–247, pl. 1–10. Waltham, Mass.: Chronica Botanica.

CRABBE, J. A., A. C. JERMY, AND J. T. MICKEL. 1975. A new generic sequence for the pteridophyte herbarium. Brit. Fern Gaz. 11:141–162.

CRONQUIST, A., A. H. HOLMGREN, N. H. HOLMGREN, AND J. L. REVEAL. 1972. Intermountain flora. Vol. 1. New York: Hafner.

EVANS, A. M. 1963. New chromosome observations in the Polypodiaceae and Grammitidaceae. Caryologia 16:671–677.

FOURNIER, E. 1872. Méxicanas plantas. Pars prima: Cryptogamia. Pp. 59–149, pl. 1–6. Paris.

GÓMEZ PIGNATARO, L. D. 1971. Ricerche citologiche sulle pteridofite della Costa Rica. 1. Ist. Bot. Reale Univ. Reale Lab. Crittog. Pavia Atti, ser. 6, 7:29–31.

HALL, F. W. 1873. Catalogue of a collection of ferns made in southern México, mainly at Chiapas, by A. Ghiesbreght, in the years 1864–70. 10 pp. New Haven, Conn.: apparently privately published.

HEMSLEY, W. B. 1885–86. Biologia centrali-americana. Vol. 3:589–664. London: R. H. Porter and Dulau & Co.

———. 1887. Historia de la exploración botanica de México. Naturaleza (Mexico City) (2)1:1–15.

HOLTTUM, R. E. 1947. A revised classification of leptosporangiate ferns. J. Linn. Soc., Bot. 53:123–158.

———. 1949. The classification of ferns. Biol. Rev. Cambridge Philos. Soc. 24:267–296.

———. 1973. Posing the problems. Pp. 1–10 *in* A. C. Jermy et al. (eds.), The phylogeny and classification of the ferns. J. Linn. Soc., Bot. 67, Suppl. 1.

JACKSON, B. D. 1912. Index to the Linnean Herbarium. Proc. Linn. Soc. London, 124th Session, 1911–1912, Suppl.:1–152.

JARRETT, F. M., I. MANTON, AND S. K. ROY. 1968. Cytological and taxonomic notes on a small collection of living ferns from Galapagos. Kew Bull. 22:475–480.

KNOBLOCH, I. W., AND D. S. CORRELL. 1962. Ferns and fern allies of Chihuahua México, i–xiv, 1–198. Renner, Texas: Texas Research Foundation.

KRAMER, K. U. 1978. The pteridophytes of Suriname. Uitgaven Natuurw. Studiekring Suriname Ned. Antillen 93:1–198.

LAWRENCE, G. H. M., A. F. G. BUCHHEIM, G. S. DANIELS, AND H. DOLEZAL, eds. 1968. B-P-H. Botanico-Periodicum-Huntianum. Pittsburgh: Hunt Botanical Library.

LEENHOUTS, P. W. 1968. A guide to the practice of herbarium taxonomy. Regnum Veg. 58:3–60.

LIEBMANN, F. M. 1849. Mexicos Bregner, en systematisk, critisk, plantgeographisk Undersögelse. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:151–332; 353–362.

MARTENS, M., AND H. GALEOTTI. 1842. Mémoire sur les fougères du Mexique. Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):1–99, pl. 1–23.

MATUDA, E. 1950a. A contribution to our knowledge of wild flora of Mt. Ovando. Amer. Midl. Naturalist 43:195–223.

———. 1950b. A contribution to our knowledge of wild and cultivated flora of Chiapas. I. Districts Soconusco and Mariscal. Amer. Midl. Naturalist 44:513–616.

———. 1956. Los helechos del Valle del México y alrededores. Anales Inst. Biol. Univ. Nac. México 27:49–168.

MICKEL, J. T. 1973. The classification and phylogenetic position of the Dennstaedtiaceae. Pp. 135–144 *in* A. C. Jermy et al. (eds.), The phylogeny and classification of the ferns. J. Linn. Soc., Bot. 67, Suppl. 1.

———, W. H. WAGNER, JR., AND K. L. CHEN. 1966. Chromosome observations on the ferns of México. Caryologia 19:95–102.

MÜLLERRIED, F. 1957. La geología de Chiapas. Tuxtla Gutiérrez: Gobierno Constitucional del Estado de Chiapas.

NAYAR, B. K. 1970. A phylogenetic classification of the homosporous ferns. Taxon 19:229–235.

PICHI SERMOLLI, R. E. G. 1973. Historical review of the higher classification of the ferns. Pp. 11–40 *in* A. C. Jermy et al. (eds.), The phylogeny and classification of the ferns. J. Linn. Soc., Bot. 67, Suppl. 1.

——— and collaborators. 1965. Index Filicum. Supplementum quartum pro annis 1934–1960. [Regnum Veg. vol. 37] Utrecht: I.B.P.T.N.

Proctor, G. R. 1977. Pp. 1–414 *in* Howard, R. A., Flora of the Lesser Antilles. Vol. 2. Pteridophyta. Jamaica Plain, Mass.: Arnold Arboretum.

Rovirosa, J. N. 1889. Vida y trabajos del naturalista Belga Augusto B. (Bonifacio) Ghiesbreght, explorador de México. Naturaleza (Mexico City), (2)1:211–217.

———. 1909. Pteridografía del Sur de México. i–iv, 1–298, pl. 1–73. México, D.F.: Ignacio Escalante.

Savage, S. 1945. A catalogue of the Linnaean Herbarium. xv + 225 pp. London: Linnean Society of London.

Sharp, A. J. 1945. Notas sobre la flora del centro de Chiapas. Soc. Bot. México Bol. 3:7.

Shimek, B. 1897. The ferns of Nicaragua. Bull. Lab. Nat. Hist. Iowa State Univ. 4:116–224, pl. 1–20.

Smith, A. R. 1971. Chromosome numbers of some New World species of *Thelypteris*. Brittonia 23:354–360.

———, and J. T. Mickel. 1977. Chromosome counts for Mexican ferns. Brittonia 29:391–398.

Sousa Sanchez, M. 1969. Las colecciones botánicas de C. A. Purpus en México. Univ. Calif. Publ. Bot. 51:1–36.

Sprengel, K. 1804. Anleitung zur Kenntniss der Gewächse, in Briefen. Dritte Sammlung. Vol. 3. Halle: K. A. Kummel.

Stafleu, F. A. 1967. Taxonomic literature. Regnum Veg. 52.

———, and R. S. Cowan. 1976. Taxonomic literature, vol. 1: A–G., ed. 2. Regnum Veg. 94.

Stolze, R. G. 1976. Ferns and fern allies of Guatemala. Part 1. Ophioglossaceae through Cyatheaceae. Fieldiana, Bot. 39:1–130.

Tryon, R. 1964. The ferns of Peru, Polypodiaceae (Dennstaedtieae to Oleandreae). Contr. Gray Herb. 194:1–253.

Vareschi, V. 1969. Flora de Venezuela. Vol. 1, parts 1 and 2:Helechos. Caracas: Instituto Botánico.

Walker, T. G. 1966. A cytotaxonomic survey of the pteridophytes of Jamaica. Trans. Roy. Soc. Edinburgh 66:169–237 (1964–65).

———. 1973. Additional cytotaxonomic notes on the pteridophytes of Jamaica. Trans. Roy. Soc. Edinburgh 69:109–135.

Key to Genera of Chiapas Ferns

1. Plants aquatic; homosporous or heterosporous 2
1. Plants terrestrial, epiphytic, or epipetric; homosporous 6

2(1). Fronds less than 3 cm long, exstipitate; heterosporous 3
2. Fronds greater than 3 cm long, stipitate; homosporous or heterosporous 4

3(2). Fronds 5–30 mm long, hirsute .... 90. *Salvinia*
3. Fronds ca. 2 mm long, glabrous .... 13. *Azolla*

4(2). Blade quadripartite, resembling clover (*Trifolium*); heterosporous .... 61. *Marsilea*
4. Blade pinnate or subdichotomous; homosporous 5

5(4). Fronds generally less than 0.5 m long, strongly dimorphic, fleshy or membranaceous; sori marginal .... 19. *Ceratopteris*
5. Fronds 2–3 m long, monomorphic or slightly dimorphic, coriaceous; sporangia covering surface of fertile blade .... 1. *Acrostichum*

6(1). Sporangia borne on erect spikes or panicles, these specialized pinnae inserted at or just below base of blade 7
6. Sporangia not borne on erect spikes or panicles, specialized pinnae, if any, in same plane as remainder of blade 9

7(6). Erect panicles 2 per fertile frond; blade not fleshy, 1-pinnate or more divided; sporangia thin-walled (1 cell thick); annulus present .... 6. *Anemia*
7. Erect portion 1 per fertile frond (but see also *Ophioglossum palmatum*); blade rather fleshy, simple to pinnate or more divided; sporangia thick-walled; annulus lacking 8

8(7). Blade simple (palmately lobed in 1 sp.); veins reticulate; fertile portion a spike .... 73. *Ophioglossum*
8. Blade ternately compound; veins free; fertile portion a panicle .... 17. *Botrychium*

9(6). Fronds extremely thin (usually 1 cell thick except at midribs), translucent; sori marginal, the soral involucre bivalvate or tubular 10
9. Fronds 3 to many cells thick, membranous to coriaceous, not usually translucent; sori various 11

10(9). Soral involucres tubular, trumpet-shaped; receptacles exserted from involucres .... 100. *Trichomanes*
10. Soral involucres bivalvate; receptacles usually included within involucres .... 48. *Hymenophyllum*

11(9). Main axis of fronds dichotomously forking; indusia absent 12
11. Main axis of fronds not dichotomously forking; indusia absent or present 16

12(11). Fronds scrambling, over 0.5 m long; ultimate branches pectinate 13
12. Fronds not scrambling, less than 0.5 m long; ultimate branches not pectinate 15

13(12). Veins in leaf segments 2–3-forked; sporangia typically 6 or more per sorus .... 33. *Dicranopteris*
13. Veins in leaf segments 1-forked; sporangia typically less than 6 per sorus 14

14(13). Blade pectinate above the last fork, usually more than one fork per frond .... 95. *Sticherus*
14. Blade bipinnate above the last (distal) fork, often only one fork per frond .... 37. *Diplopterygium*

15(12). Fronds decidedly stipitate, 30–50 cm long, the stipes usually angular; sporangia on marginal or terminal projections .... 92. *Schizaea*
15. Fronds more or less exstipitate, 1–7 cm long, the stipes, if any, terete and alate; sporangia along veins .... 44. *Hecistopteris*

16(11). Rachis or rhizome high-climbing or scrambling 17
16. Rachis or rhizome not high-climbing or scrambling 23

17(16). Rhizome high-climbing, densely scaly 18
17. Rhizome subterranean, rachis high-climbing or scandent, not densely scaly 20

18(17). Fertile pinnae at least lobed; veins of sterile pinnae anastomosing, with at least a marginal commissure .... 84. *Polybotrya*
18. Fertile pinnae simple; veins areolate or free 19

19(18). Veins areolate .... 15. *Bolbitis*
19. Veins free .... 54. *Lomariopsis*

20(17). Sporangia borne on marginal projections (lobes) .... 59. *Lygodium*
20. Sporangia dorsal or marginal, not on projections 21

21(20). Indusia absent; sporangia dorsal along veins; rachis without spines .... 41. *Eriosorus*
21. Indusia present; sporangia (sori) marginal or nearly so; rachis with or without spines 22

22(21). Indusium an extrorse flap, sori in a marginal cup; ultimate leaf divisions linear .... 70. *Odontosoria*
22. Indusium a modified, introrse, marginal tooth or flap; ultimate leaf divisions oblong .... 49. *Hypolepis*

23(16). Fronds (at least the sterile ones) simple, the margin entire to wavy but not deeply lobed 24
23. Fronds lobed or divided to decompound 45

24(23). Fronds dimorphic 25
24. Fronds monomorphic 27

25(24). Sporangia acrostichoid .... 40. *Elaphoglossum*
25. Sporangia organized into discrete sori or coenosori 26

26(25). Sori round; rhizome long-creeping; plants epiphytic or epipetric .... 63. *Microgramma*
26. Sori marginal, elongate (coenosori); rhizome erect; plants terrestrial .... 34. *Dictyoxiphium*

27(24). Stipe setose, the hairs dark; fronds usually less than 12 cm long .... 42. *Grammitis*
27. Stipe not setose, or if setose, the hairs light; fronds usually more than 12 cm long (but see *Cochlidium*) 28

28(27). Sori round or nearly so 29
28. Sori elongate (coenosori) or sporangia acrostichoid 34

29(28). Plants terrestrial or epipetric; rhizome erect; sori indusiate .... 97. *Tectaria*
29. Plants epiphytic or infrequently terrestrial; rhizome creeping; sori indusiate or exindusiate 30

30(29). Fronds decidedly articulate on long, thin phyllopodia; sori indusiate; veins free .... 71. *Oleandra*
30. Fronds indefinitely articulate or not articulate, if articulate then phyllopodia short, obscure; sori exindusiate; veins anastomosing 31

31(30). Fronds scaly, dull, usually less than 20 (30) cm long .... 83. *Pleopeltis*
31. Fronds glabrous, shining, various lengths 32

32(31). Fronds less than 15 cm long; sori in a single row on each side of midrib .... 63. *Microgramma*
32. Fronds greater than 15 cm long; sori in usually more than one row on each side of midrib 33

33(32). Sori in single rows between the principal side veins .... 68. *Niphidium*
33. Sori in double rows between the principal side veins .... 18. *Campyloneurum*

34(28). Sori indusiate 35
34. Sori exindusiate 38

35(34). Blade orbicular; stipe black, shining .... 91. *Schaffneria*
35. Blade linear; stipe not black, dull, or stipe lacking 36

36(35). Blade cordate at base, entire toward tip, stalked .... 79. *Phyllitis*
36. Blade cuneate or rounded at base, usually serrate towards tip, stalked or not 37

37(36). Indusia, at least the basal ones, back-to-back along both sides of veins; blade stalked; terrestrial .... 36. *Diplazium*
37. Indusia along one side of veins only; blade ± sessile; usually epiphytic .... 11. *Asplenium*

38(34). Sorus, at least at maturity, appearing as a single line above midrib; rhizome scales tan, concolorous .... 24. *Cochlidium*
38. Sori not above the midrib; rhizome scales brown to blackish, often clathrate 39

39(38). Sporangia not in discrete sori, scattered along veins and also between them .... 7. *Anetium*
39. Sporangia organized into discrete sori 40

40(39). Sori confined to distal third of frond, marginal .... 67. *Neurodium*
40. Sori throughout the blade length, marginal or not 41

41(40). Sori 2 or in 2 lines, paralleling the midrib; rhizome scales clathrate or not 42
41. Sori several, along veins; rhizome scales clathrate 44

42(41). Rhizomes scales not clathrate; blades greater than 5 mm broad; leaf tissue with minute scales ..... 83. *Pleopeltis*
42. Rhizome scales clathrate; blades of various widths; leaf tissue glabrous 43

43(42). Areoles in a single row between midrib and margin; blade less than 5 mm broad .... 101. *Vittaria*
43. Areoles in 2 to several rows between midrib and margin; blade greater than 5 mm broad .... 5. *Ananthacorus*

44(41). Midrib absent or extending only part way to frond apex .... 9. *Antrophyum*
44. Midrib reaching to frond apex .... 57. *Loxogramme*

45(23). Blade palmately lobed or divided, or radiate 46
45. Blade pinnately lobed or divided 50

46(45). Blade glabrous; sori marginal 47
46. Blade minutely scaly or hairy below; sori lacking, the sporangia acrostichoid or scattered along veins 48

47(46). Blade pinnate-pinnatifid or bipinnatifid; segments few, broad, not dimidiate .... 38. *Doryopteris*
47. Blade bipinnate; segments many, narrow, somewhat dimidiate .... 2. *Adiantopsis*

48(46). Blade minutely scaly below; fronds dimorphic, the fertile ± orbicular .... 76. *Peltapteris*
48. Blade hirsute to tomentose below; fronds monomorphic or subdimorphic, the fertile palmately lobed 49

49(48). Venation areolate; sporangia scattered .... 46. *Hemionitis*
49. Venation free; sporangia mostly near frond margins .... 16. *Bommeria*

50(45). Blade lobed to pinnatifid, not 1-pinnate to decompound or pinnate-pinnatifid 51
50. Blade 1-pinnate to decompound or pinnate-pinnatifid 60

51(50). Fronds decidedly dimorphic, the fertile ones greatly contracted 52
51. Fronds monomorphic or only slightly dimorphic 53

52(51). Rhizome scaly; fronds leathery .... 14. *Blechnum*
52. Rhizome glabrous; fronds membranaceous .... 81. *Plagiogyria*

53(51). Stipe with dark setae, mostly less than 15 cm long; veins free .... 42. *Grammitis*
53. Stipe scaly or glabrous, usually more than 15 cm long; veins free to anastomosing 54

54(53). Sori definitely elongate; veins free 55
54. Sori round or, if elongate, the veins anastomosing 56

55(54). Indusia, at least the basal ones, back-to-back along both sides of veins; rhizome scales not clathrate; sporangial stalks 2–3 rows of cells .... 36. *Diplazium*
55. Indusia along only one side of veins; rhizome scales clathrate; sporangial stalks a single row of cells .... 11. *Asplenium*

56(54). Sori indusiate 57
56. Sori exindusiate 58

57(56). Venation complexly netted; sori scattered .... 97. *Tectaria*
57. Venation free; sori along midribs (costae) only .... 14. *Blechnum*

58(56). Lamina below minutely scaly; blade with (1) 2–4 pairs of lateral segments (see also *Polypodium colysoides*) .... 83. *Pleopeltis*
58. Lamina below minutely scaly, hairy, or glabrous; blade usually with 5 or more pairs of lateral segments 59

59(58). Blade often glaucous below; venation simply netted, with two to several rows of areoles .... 78. *Phlebodium*
59. Blade not glaucous below; venation free or simply netted, with 1 (2) rows of areoles .... 85. *Polypodium*

60(50). Blade 1-pinnate, the pinnae unlobed (sometimes serrate, dentate, or spinulose) 61
60. Blade 1-pinnate-pinnatifid (the pinnae at least slightly lobed) or more divided 94

61(60). Fronds decidedly dimorphic, the fertile pinnae greatly contracted 62
61. Fronds monomorphic or only slightly dimorphic, the fertile pinnae not or only slightly contracted 68

62(61). Rhizome erect or short-creeping; stipes fascicled 63
62. Rhizome long-creeping; stipes remote 65

63(62). Sporangia synangial ..... 30. *Danaea*
63. Sporangia not synangial 64

64(63). Rhizome scaly; lamina leathery ..... 14. *Blechnum*
64. Rhizome not scaly; lamina thin ..... 81. *Plagiogyria*

65(62). Pinnae with basal glands, articulate to rachis; margins cartilaginous-serrate ..... 54. *Lomariopsis*
65. Pinnae without basal glands, not articulate to rachis; margins not cartilaginous-serrate 66

66(65). Fertile pinnae lobed or more divided; veins of sterile pinnae anastomosing, at least with a marginal commissure ..... 84. *Polybotrya*
66. Fertile pinnae entire; veins free or anastomosing 67

67(66). Veins of sterile pinnae free ..... 14. *Blechnum*
67. Veins of sterile pinnae anastomosing ..... 15. *Bolbitis*

68(61). Sporangia acrostichoid or in synangia; fronds slightly dimorphic 69
68. Sporangia organized into discrete sori, but not synangial; fronds monomorphic 70

69(68). Sporangia acrostichoid ..... 1. *Acrostichum*
69. Sporangia synangial ..... 30. *Danaea*

70(68). Sori round or reniform, dorsal 71
70. Sori elongate, dorsal or marginal, or nearly round and marginal 83

71(70). Veins anastomosing 72
71. Veins free 76

72(71). Venation complex, the pattern irregular, without prominent side veins; rhizome short-creeping to suberect; plants terrestrial or epipetric; fronds not articulate 73
72. Venation fairly simple, the pattern regular, usually with prominent side veins; rhizome short- to long-creeping; plants terrestrial or epiphytic; fronds articulate or not 74

73(72). Free included veinlets present; sori indusiate ..... 97. *Tectaria*
73. Free included veinlets absent; sori indusiate or exindusiate ..... 77. *Phanerophlebia*

74(72). Plants usually epiphytic; fronds eventually cleanly articulate ..... 85. *Polypodium*
74. Plants terrestrial; fronds not articulate 75

75(74). Indusia basal, semicircular to circular; spores tetrahedral ..... 23. *Cnemidaria*
75. Indusia reniform or absent; spores bilateral ..... 98. *Thelypteris*

76(71). Sori exindusiate 77
76. Sori indusiate 80

77(76). Plants terrestrial; fronds usually more than 1 m long 78
77. Plants epiphytic, occasionally epipetric; fronds mostly less than 0.6 m long 79

78(77). Distal pinnae broadly adnate to rachis ..... 96. *Stigmatopteris*
78. Distal pinnae sessile or slightly basiscopically adnate to rachis ..... 62. *Metaxya*

79(77). Stipe (and often lamina) dark-setose, not articulate; spores tetrahedral, green ..... 42. *Grammitis*
79. Stipe glabrous or scaly, sometimes hairy, but not dark-setose, articulate; spores bilateral, usually whitish to yellowish ..... 85. *Polypodium*

80(76). Indusia reniform; pinnae frequently with hydathodes adaxially; pinnae often articulate ..... 66. *Nephrolepis*
80. Indusia peltate; pinnae lacking hydathodes; pinnae articulate or not 81

81(80). Blade linear, less than 5 cm broad; pinnae dentate ..... 86. *Polystichum*
81. Blade ovate, greater than 5 cm wide; pinnae entire to spinulose 82

82(81). Pinnae often more than (12) 18 pairs, articulate to rachis, basiscopic lobe overlapping rachis ..... 28. *Cyclopeltis*
82. Pinnae fewer than 12 (17) pairs, not articulate to rachis, if auriculate, the basiscopic lobe not overlapping rachis ..... 77. *Phanerophlebia*

83(70). Sori marginal 84
83. Sori dorsal 87

84(83). Frond margins not reflexed; lamina densely scaly below, often obscuring sporangia .... 69. *Notholaena*
84. Frond margins reflexed or revolute over sori 85

85(84). Sporangia borne on the thin reflexed indusium; stipe and rachis atropurpureous to blackish and shining .... 3. *Adiantum*
85. Sporangia borne marginally on the thick, unmodified blade tissue, covered by a reflexed modified margin; stipe and rachis variously colored 86

86(85). Stipe and rachis dark, usually with flexuous hairs .... 75. *Pellaea*
86. Stipe and rachis light, glabrous .... 88. *Pteris*

87(83). Sori discrete, indusiate 88
87. Sori spreading or confluent, exindusiate 91

88(87). Sori parallel to midrib .... 14. *Blechnum*
88. Sori not parallel to midrib 89

89(88). Indusia, at least the basal ones, back-to-back along both sides of veins .... 36. *Diplazium*
89. Indusia along one side of vein only 90

90(89). Veins free; fronds generally less than 0.6 m long .... 11. *Asplenium*
90. Veins anastomosing near pinna margin; fronds 1 m or more long .... 45. *Hemidictyum*

91(87). Fronds indeterminate; pinnae orbicular, 5 mm or less long; plants of high elevations .... 50. *Jamesonia*
91. Fronds determinate; pinnae oblong to lanceolate, more than 5 mm long; plants of low and middle (occasionally high) elevations 92

92(91). Rachis adaxially grooved and setose .... 98. *Thelypteris*
92. Rachis adaxially terete or, if grooved, then not setose 93

93(92). Blade scaly beneath, the surface obscured, sporangia at least partially hidden .... 69. *Notholaena*
93. Blade glabrous or sparsely pubescent beneath, the surface and sporangia clearly visible .... 43. *Gymnopteris*

94(60). Fronds dimorphic or hemidimorphic 95
94. Fronds monomorphic 99

95(94). Fronds less than 15 cm long; rhizome filiform .... 76. *Peltapteris*
95. Fronds more than 30 cm long; rhizome thick 96

96(95). Veins of sterile pinnae anastomosing .... 15. *Bolbitis*
96. Veins of sterile pinnae free 97

97(96). Rhizome apex hairy; sporangia opening by a transverse slit, without a well-developed annulus; spores green .... 74. *Osmunda*
97. Rhizome scaly; sporangia with a vertical annulus, this well-developed; spores tan to brown 98

98(97). Pinnae dimorphic on the same frond, the fertile greatly contracted; rhizome short-creeping to suberect .... 53. *Llavea*
98. Pinnae monomorphic on the same frond, fronds either all fertile or all sterile; rhizome long-creeping .... 84. *Polybotrya*

99(94). Sori dorsal 100
99. Sori marginal or submarginal 131

100(99). Sori spreading or confluent, elongate, exindusiate 101
100. Sori discrete, often indusiate 104

101(100). Veins anastomosing .... 98. *Thelypteris*
101. Veins free 102

102(101). Blade membranaceous, less than 15 (30) cm long, not waxy beneath .... 8. *Anogramma*
102. Blade firm, more than (15) 30 cm long, waxy or not 103

103(102). Rhizome scaly; blade often waxy beneath .... 80. *Pityrogramma*
103. Rhizome hairy; blade not waxy beneath .... 41. *Eriosorus*

104(100). Sporangia synangial; stipe base stipules large and fleshy .... 60. *Marattia*
104. Sporangia not synangial; stipes exstipulate 105

105(104). Sori elongate 106
105. Sori round or reniform 112

106(105). Sori in chains parallel to costules (or costae) .... 103. *Woodwardia*
106. Sori not in chains 107

107(106). Indusia, at least the basal ones, back-to-back along both sides of veins 108
107. Indusia along only one side of veins 109

108(107). Blade bipinnate, the pinnules ± entire, dimidiate, lacking a distinct midrib .... 35. *Didymochlaena*
108. Blade variously divided, if bipinnate the pinnules not dimidiate, usually with a midrib .... 36. *Diplazium*

109(107). Rhizome and stipe base scales clathrate 110
109. Rhizome and stipe base scales not clathrate 111

110(109). Indusia 2 to many times longer than broad, free at the ends .... 11. *Asplenium*
110. Indusia scarcely longer than broad, adnate at the ends, pocketlike .... 58. *Loxoscaphe*

111(109). Pinnules articulate, subdimidiate .... 35. *Didymochlaena*
111. Pinnules not articulate or dimidiate .... 12. *Athyrium*

112(105). Plants arborescent (trunks 1 m or more long); fronds 1–5 m long 113
112. Plants not arborescent; fronds less than 1.5 m long (except *Lophosoria quadripinnata* and *Cnemidaria decurrens*) 117

113(112). Some, usually many, scales of stipe and other axes bearing dark apical (and often marginal) setae 114
113. Scales of stipe and other axes lacking dark setae 116

114(113). Stipe, rachis, and usually costae blackish; indusia absent; skeletal pinnae (aphlebiae) present at base of fronds .... 4. *Alsophila*
114. Stipe, rachis, and costae brown to stramineous; indusia present or absent; aphlebiae absent 115

115(114). Stipe with stout, sharp, blackish, conical spines; indusia present; stipe base scales structurally marginate (marginal cells differentiated from central ones in shape and color); axes brownish .... 65. *Nephelea*
115. Stipe lacking stout spines (though sometimes muricate with persistent bases of scales); indusia present or absent; stipe base scales structurally conform (marginal and central cells similar in size, shape, and orientation); axes tan to stramineous .... 93. *Sphaeropteris*

116(113). Indusia present, saucer-shaped, cup-shaped, or globose (often split at maturity) .... 27. *Cyathea*
116. Indusia absent .... 99. *Trichipteris*

117(112). Blade usually white-waxy beneath; rhizome and blade hairy, lacking scales; fronds mostly 1–3 m long .... 56. *Lophosoria*
117. Blade not white-waxy beneath; rhizome and sometimes blade scaly; blade size various 118

118(117). Veins connivent or anastomosing 119
118. Veins free 121

119(118). Indusia attached basally, semicircular to circular; spores tetrahedral; fronds 1–2.5 m long .... 23. *Cnemidaria*
119. Indusia reniform or peltate (attached centrally), or absent; spores bilateral; blade length various, often less than 1 m long 120

120(119). Adaxial costal grooves usually with acicular setae; stipe base with 2 vascular bundles .... 98. *Thelypteris*
120. Adaxial costal grooves without acicular setae but with very short, reddish, multicellular hairs; stipe base with numerous vascular bundles .... 97. *Tectaria*

121(118). Indusia cuplike .... 102. *Woodsia*
121. Indusia not cuplike, sometimes absent 122

122(121). Indusia extrorse, hoodlike .... 29. *Cystopteris*
122. Indusia not extrorse and hoodlike, often absent 123

123(122). Lamina scaly below, the scales ovate-peltate .... 85. *Polypodium*
123. Lamina without scales below, or if scaly then the scales lanceolate to fibrillose, not peltate 124

124(123). Rachis not adaxially grooved or, if grooved, the groove not open to admit costal grooves; stipe vasculature various 125
124. Rachis adaxially grooved, the groove open to admit costal grooves; stipe with numerous vascular bundles 127

125(124). Rachis hairs unicellular, acicular, stiff, whitish (if multicellular, then greater than 0.5 mm long); scales often glandular or hairy; blade pinnate-pinnatifid (decompound in *Thelypteris torresiana*); stipe at base with 2 vascular bundles .... 98. *Thelypteris*
125. Rachis hairs multicellular, usually reddish; scales without superficial hairs or glands; blade of most species 2-pinnate or more (except a few *Ctenitis* spp.); stipe at base with numerous vascular bundles 126

126(125). Decurrent wing of lamina not thickened .... 25. *Ctenitis*
126. Decurrent wing of lamina thickened .... 51. *Lastreopsis*

127(124). Indusia absent 128
127. Indusia present 129

128(127). Segments spinulose at tip and often margin; axes below fibrillose-scaly ... 86. *Polystichum*
128. Segments not spinulose at tip and margin; axes below not fibrillose-scaly ... 96. *Stigmatopteris*

129(127). Indusia truly peltate ... 86. *Polystichum*
129. Indusia reniform, sometimes appearing peltate because of overlapping lobes of indusium ... 130

130(129). Blade deltoid, (4) 5-pinnate; segments mostly free, cuneate at base, spinulose at tip ... 10. *Arachniodes*
130. Blade deltoid to lanceolate, 1–4-pinnate; segments mostly adnate, lacking bristle-tips ... 39. *Dryopteris*

131(99). Blade margins not or scarcely reflexed, not covering sori ... 132
131. Blade margins strongly reflexed, covering sori ... 140

132(131). Extrorse indusia absent ... 133
132. Extrorse indusia present, forming a marginal cup or slit ... 134

133(132). Sori round; fronds usually greater than (50) 100 cm long ... 49. *Hypolepis*
133. Sori spreading or confluent, elongate; fronds mostly less than 50 cm long ... 69. *Notholaena*

134(132). Indusia elongate parallel to margin; rhizome scaly ... 52. *Lindsaea*
134. Indusia not elongate parallel to margin, cup- or clam-shaped, or tubular; rhizome hairy or scaly ... 135

135(134). Rhizome scaly; sori inframarginal, the laminar tissue visible beyond the extrorse indusium ... 89. *Saccoloma*
135. Rhizome hairy; sori marginal ... 136

136(135). Blade less than 50 cm long; ultimate segments linear to oblanceolate, cuneate at base; rhizome 1–2 mm diam. ... 94. *Sphenomeris*
136. Blade greater than 50 cm long, often more than 1 m; ultimate segments oblong; rhizome mostly greater than 5 mm diam. ... 137

137(136). Rhizome long-creeping, not forming an erect or suberect caudex ... 31. *Dennstaedtia*
137. Rhizome short-creeping to often suberect or erect, forming a rather massive caudex ... 138

138(137). Blade 4-pinnate or more divided; costae and costules deeply sulcate on adaxial side, the furrow flanked by prominent ribs that are decurrent onto axis of next order ... 26. *Culcita*
138. Blade tripinnate or subtripinnate; costae and costules raised or only slightly furrowed, the ribs (if any) not decurrent onto axis of next order ... 139

139(138). Outer valve of indusium similar to inner valve, both cartilaginous; trichomes on costae and costules (ours) lax and filiform, whitish to stramineous; paraphyses sparse, minute, concealed by sporangia ... 22. *Cibotium*
139. Outer valve of indusium consisting of a scarcely altered, revolute crenation of the leaf margin; trichomes on adaxial side of costae and costules rigid and stout, dark brown (ours); paraphyses abundant, as long as or longer than sporangia ... 32. *Dicksonia*

140(131). Stipe and rachis densely scaly with broad scales ... 82. *Plecosorus*
140. Stipe and rachis not scaly or sparsely scaly with narrow scales ... 141

141(140). Rhizome hairy (mixed with scales in *Histiopteris*), long-creeping ... 142
141. Rhizome scaly only, short-creeping to erect (except long-creeping in some *Adiantum* and *Cheilanthes* spp.) ... 145

142(141). Sori discrete; rhizome long-creeping ... 49. *Hypolepis*
142. Sori continuous; rhizome various ... 143

143(142). Veins anastomosing; spores bilateral, monolete ... 47. *Histiopteris*
143. Veins free; spores tetrahedral-globose, trilete ... 144

144(143). Blade pinnate; leaf tissue membranaceous; rhizome short-creeping, succulent ... 55. *Lonchitis*
144. Blade tripartite; leaf tissue chartaceous to subcoriaceous; rhizome long-creeping, woody ... 87. *Pteridium*

145(141). Sporangia borne on reflexed leaf margins; leaf segments often dimidiate or cuneate-flabellate ... 3. *Adiantum*
145. Sporangia covered by reflexed leaf margins but borne on unmodified tissue; leaf segments not dimidiate, rarely cuneate ... 146

146(145). Adaxial groove of stipe and rachis densely clavate-hirsute ... 64. *Mildella*
146. Adaxial groove of stipe and rachis, if any, not densely clavate-hirsute ... 147

147(146). Fronds of most spp. over 80 cm long; spores with an equatorial flange ... 88. *Pteris*
147. Fronds less than 60 cm long; spores lacking an equatorial flange ... 148

148(147). Stipe gray to light brown or, if darker, then glaucous, glabrous and the pinnae ternate or simply pinnate, with few (less than 5 pairs) segments; axes lacking scales ... 75. *Pellaea*
148. Stipe dark brown to atropurpureous or, if lighter brown, then glandular-viscid; pinnae never ternate, rarely simply pinnate; axes often scaly ... 149

149(148). Blade deltoid; ultimate segments broadly lanceolate to oblong-lanceolate; veins conspicuous; indusia continuous, broad, convex; rhizome suberect .... 21. *Cheiloplecton*
149. Blade lanceolate to deltoid; ultimate segments beadlike to linear; veins inconspicuous or conspicuous; indusia continuous or interrupted, broad to narrow; rhizome creeping to suberect .... 20. *Cheilanthes*

1. ACROSTICHUM

Acrostichum L., Sp. Pl. 2:1067. 1753. —Lectotype (first chosen by J. Smith?, Hist. Fil. 146. 1875): *Acrostichum aureum* L. *Chrysodium* Fée, Mém. Fam. Foug. 2:22. 1845. —Type: uncertain, several species cited.

Plants terrestrial in swamps and marshes; rhizome creeping to usually erect, stout, dictyostelic, scaly, often forming massive tussocks; fronds caespitose, nonarticulate; blade simply pinnate, with a conform terminal pinna, pinnae entire; veins anastomosing, areoles minute, elongate-hexagonal, without included veinlets; sporangia borne all over abaxial surface of fertile pinnae (without distinct sori), intermixed with capitate paraphyses (apparently abortive sporangia); indusia lacking; spores globose with a trilete scar, ± smooth to minutely roughened, translucent and colorless; $x = 30$.

A few species (perhaps 3–5), all rather similar to the most widespread one, *A. aureum,* which is pantropic. Two species occur in the New World, and both are found in Chiapas, usually in full sun in swamps (mangrove) and brackish water and also freshwater lakes. The affinities of *Acrostichum* are uncertain. Most authors (e.g., Copeland, 1947) have allied it with the pteroid ferns (*Pteris* and allies).

References: Maxon, W. R. 1926. Pteridophyta. Pp. 373–521 *in* Scientific Survey of Porto Rico and the Virgin Islands 6 (*Acrostichum,* p. 401–402); Lloyd, R. M., and T. L. Gregg. 1975. Reproductive biology and gametophyte morphology of *Acrostichum danaeifolium* from Mexico. Amer. Fern J. 65:105–120; Adams, D. C., and P. B. Tomlinson. 1979. *Acrostichum* in Florida. Amer. Fern J. 69:42–46.

Fertile fronds with only the distal pinnae (up to 5 pairs plus terminal segment) fertile; pinnae usually not more than 30, rather distant and often irregularly distributed, usually not overlapping, the lowest pinnae always distant, long-stalked (to 3 cm); areoles next to costa narrow, always 3 times longer than wide .... 1. *A. aureum*
Fertile fronds with all or most of the pinnae fertile, rarely only a few distal ones fertile; pinnae usually 40–60, closely set, overlapping and regularly arranged, often subopposite, the lowest pinnae relatively short-stalked (less than 2 cm); areoles next to costa broad, never more than 3 times longer than wide .... 2. *A. danaeifolium*

1. **Acrostichum aureum** L., Sp. Pl. 2:1069. 1753.

—Lectotype (to be chosen by Lellinger, in litt.): Plumier's Desc. Pl. Amer. pl. 7. 1693; according to Jackson (1912), LINN 1245.5 was not present in LINN prior to 1756.

Illustrations: Small, Ferns SE States 68. 1938; Proctor, Fl. L. Antill. 2:151. 1977.

Fronds 1–4 m long; basal scales not leaving prominent scars; blade 1–2 m long, with 1–5 pairs of distal pinnae fertile, proximal pinnae sterile; rachis rounded below, decidedly grooved above with margin of groove acute, and with short spines (midribs of aborted pinnae) frequent on lower part of rachis; pinnae relatively few (10–15 pairs), alternate, subdistant, oblique, long-stalked, elliptic-ligulate, 15–30 cm long, 3–6 cm broad, rounded-obtuse at apex, emarginate, cuneate at base; leaf tissue light green, rigidly coriaceous, glabrous beneath; areoles next to costa narrow, always 3 times longer than wide; paraphyses with a slender stalk, ending in a single, ± isodiametric, irregularly much-lobed cell; $n = 30$, $2n = 60$ (Jam., O. W.).

Coastal swamps (mangrove) and salt marshes; known in Chiapas by a single collection in s Pacific Coastal Plain, Acapetahua, "on sunny sandy beach." Southern and w Mex. (Nay.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. to Fr. Gui. and s Braz., Parag.); Fla., Antill., Trin.; O. W. trop. Chiapas Collections: *EM 2672* (K, MEXU, UC, US).

2. **Acrostichum danaeifolium** Langsd. & Fisch., Icon. Fil. 5, pl. 1. 1810.

—Type: Brazil, "insula St. Catharine," *Krusenstern s.n.* (presumably LE).

Chrysodium lomarioides Jenm., Timehri 4:314. 1885. —*Acrostichum lomarioides* (Jenm.) Jenm., Bull. Bot. Dept. (2)5:154. 1898, not Bory, 1833. —*Acrostichum excelsum* Maxon, Proc. Biol. Soc. Wash. 18:224. 1905. —Type: British Guiana [=Guyana], *Jenman s.n.* (K?).

Chrysodium lomarioides hastatum Christ, Bull. Herb. Boissier (2)5:725. 1905. —Type: Mexico, Chiapas, hot sulphur spring near El Carmen, *Münch s.n.* (presumably P; isotype DS!).

Illustration: **Fig. 2**; Small, Ferns SE States 70. 1938.

Fronds 1.5–3.5 m long, the fertile somewhat longer than the sterile; basal scales leaving prominent scars; blade 1.0–2.5 m long; rachis with several shallow grooves below, flat or scarcely grooved above, with margins of the groove blunt, and with basal spines or aborted pinnae absent; pinnae relatively numerous (usually 40–60), proximal ones distant, subopposite, short-stalked, middle ones close or crowded, imbricate on drying, nearly sessile, 15–40 cm long, 3–6 cm broad, lance-linear to ligulate, broadly cuneate at base, acute or acutish at apex; distal pinnae semi-adnate below; leaf tissue chartaceous, often finely pubescent beneath; areoles next to costa broad, never more than 3 times longer than wide; paraphyses with stalk ending in a horizontally extended, smooth or little-lobed cell; $2n = 60$ (Jam.).

Edges of hot springs, ditches, and lakes; uncommon in Central Plateau and Eastern Highlands; 350 m and probably higher. Southern and w Mex. (Nay., Cma., Gro., Oax., Ver., Tab., Camp., Yuc.), Bel., Guat., Salv., Nic., C.R.; S.A. (Col. to s Braz.); Fla., Antill., Berm. Chiapas Collections: *GM s.n.* (DS); *GM 22* (DS); *S 1672* (US); *33175*.

2. ADIANTOPSIS

Adiantopsis Fée, Gen. Fil. 145. 1852. —LECTOTYPE (chosen by Christensen, Ind. Fil. xli. 1906): *Adiantopsis radiata* (L.) Fée [≡*Adiantum radiatum* L.].

Plants terrestrial; rhizome erect, scaly, scales narrow, concolorous or weakly bicolorous, brown, moderately stiff, margins entire; stipe and pinna rachises sulcate or adaxially flattened, with narrow membranaceous wings, atropurpureous, scaly at stipe bases, otherwise glabrous; blade ternate to digitate with usually 3–8 pinnae, bipinnate; pinnae narrowly elliptic, acute at apex and base; ultimate segments sessile to short-petiolulate, subdimidiate, more or less quadrangular, rounded at apex, distally auriculate at base, glabrous; veins simple, free; sori marginal, discrete; indusia scarious, discrete; $x = 30$.

Five or six species in Central and South America and the West Indies, plus one species in Madagascar. *Adiantopsis* is closely related to *Cheilanthes* and probably derived from elements within *Cheilanthes*. If *C. chlorophylla* Swartz is placed in *Adiantopsis*, as some authors have done, the distinction between the two genera is difficult to maintain, as *Cheilanthes chlorophylla* seems closely related to such species as *C. microphylla* and *C. aemula*. Another problematical species sometimes placed in *Adiantopsis* is *C. seemannii* Hook., described from the Sierra Madre of northwestern Mexico.

REFERENCE: MAXON, W. R. 1908. The Cuban species of *Adiantopsis*. Contr. U.S. Natl. Herb. 10:485–486.

1. **Adiantopsis radiata** (L.) Fée, Gen. Fil. 145. 1852.

—*Adiantum radiatum* L., Sp. Pl. 2:1094. 1753. —*Cheilanthes radiata* (L.) J. Smith, J. Bot. (Hooker) 4:159. 1841. —LECTOTYPE (chosen by Lellinger, Mem. New York Bot. Gard. 23:3. 1972): perhaps Jamaica, *Sloane*, labeled "Adiant. 3 radiatum" (BM). According to Jackson (1912), LINN 1252.1 was not in LINN until after 1755.

ILLUSTRATIONS: **Fig. 3**; Hooker, Sp. Fil. 2:pl. 91A. 1852 [as *Hypolepis radiata* (L.) Hook.]; Tryon, Contr. Gray Herb. 194:101, fig. 64. 1964; Proctor, Fl. L. Antill. 2:177. 1977.

Rhizome apex scales subulate, bicolorous, with a dark, sclerotic central portion and lighter, ferruginous, thin margins; stipe mostly 20–50 cm long, 1–2 mm diam.; blade circular in outline, with pinnae originating from the same point; pinnae mostly 6–8 (11), to ca. 20 cm long, 1.5–2.5 cm broad, with up to 40 pairs of pinnules, these oblong, subentire to crenate (especially on sterile pinnules), reduced at base and toward pinna apex; pinnules articulate with age; indusia semicircular to oblong, well modified; $2n = 60$ (Trin.).

Slopes in Tropical and Montane rain forests, Seasonal Evergreen Forest; scattered in Eastern and Northern highlands (but not Jitotol Ridge), SE Central Plateau, interface of Central Depression and Sierra Madre; 300–1350 m. Southern Mex. (Tam., Ver.), Bel., Guat., Hond., Nic.; S.A. (Col. and Ven. to Bol., Parag., s Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *EM 165* (DS); *Me 2076* (US); *MC 1848* (US); *21884*; *21909*; *29080*; *33028*; *33159*; *34125*; *39137*.

3. ADIANTUM

Adiantum L., Sp. Pl. 2:1094. 1753. —LECTOTYPE (first chosen by J. Smith, Hist. Fil. 274. 1875): *Adiantum capillus-veneris* L.
Hewardia J. Smith, J. Bot. (Hooker) 3:432, pls. 16–17. 1841. —TYPE: *Hewardia adiantoides* J. Smith [≡*Adiantum adiantoides* (J. Smith) C. Chr.].

Plants terrestrial or epipetric; rhizome short- to long-creeping or suberect, scaly; stipe scaly or not, commonly dark reddish brown to atropurpureous to blackish, shining; blade commonly 1–4 (6) times pinnate (rarely simple) or helicoid; ultimate segments sessile to short-stalked, never adnate, commonly rectangular, trapezoidal, or flabellate and cuneate at base; leaf tissue commonly glabrous, glaucous in many species, a few species with scattered hairs and/or scales, or waxy; veins ± dichotomously forking, commonly free, anastomosing in a very few species; sporangia borne along veins on inner face of reflexed segment margin (false indusium), sporangia ± confluent at maturity, without paraphyses; indusium orbicular to lunate to oblong or linear and continuous; spores globose-tetrahedral, trilete, yellowish to light brown, seemingly without perispore; $x = 29, 30$.

Subcosmopolitan, with perhaps 200 species (Copeland, 1947), most numerous in Neotropics. Tryon (1964) believed that about 75 species occur in South America, with 39 recognized from Peru. About 20–25 species are known from the Greater Antilles, about half of these also found in Mexico. Altogether, 31 species are known from Mexico, 28 of these having been found in Chiapas. Centers of diversity in the New World are Andean South America and, to a lesser extent, Mexico, Greater Antilles, and southern Brazil.

In general, species of *Adiantum* occur at low elevations (below 1500 m), but a few are at middle to higher elevations (e.g., *A. andicola* and *A. poiretii* in Chiapas). Of the species that grow at lower elevations, those with flabellate segments are often found in seasonal vegetational formations, while those with trapeziform or oblong-lanceolate nonarticulate segments often grow in Tropical and

Lower Montane rain forests. Several species growing in seasonal formations have articulate deciduous segments.

References: Scamman, E. 1960. The Maidenhair ferns (*Adiantum*) of Costa Rica. Contr. Gray Herb. 187:3–22; Tryon, R. 1964. The ferns of Peru. Contr. Gray Herb. 194:1–253 (*Adiantum*, pp. 135–180); Morton, C. V. 1955. Notes on *Adiantum* in Mexico, I. Amer. Fern J. 45:113–117.

a. Blade 1-pinnate.

b. Pinnae borne on long, slender stalks (mostly longer than 5 mm), color of stalk stopping abruptly at pinna base.

c. Pinnae large (mostly 5–10 cm long), ovate-acuminate, relatively few (1–4 lateral pairs) .... 21. *A. seemannii*

cc. Pinnae small, mostly less than 2 cm long, flabellate, broadly to narrowly cuneate at base, usually more than 5 pairs.

d. Pinnae broadly cuneate at base; sterile margins entire or with obscure, rounded lobes ... 12. *A. lunulatum*

dd. Pinnae narrowly cuneate at base; sterile margins sharply serrate .... 7. *A. deflectens*

bb. Pinnae sessile or short-stalked (less than 5 mm), color of stalk passing into base of pinna.

e. One long sorus along each edge of pinna, sorus occasionally interrupted; pinnae not excised basiscopically.

f. Veins all free; pinnae sessile or with a very short stalk (less than 3 mm); lowermost pinnae with a broad truncate to subcordate to biauriculate base .... 13. *A. macrophyllum*

ff. Veins anastomosing towards the edge; pinnae usually with a short stalk 2–4 mm long; pinnae rounded to cordate at their base .... 8. *A. dolosum*

ee. Numerous short, oblong-arcuate sori along pinna margin; pinnae excised basiscopically.

g. Pinnae green below, usually shining on both sides, the sterile ones or portions deeply and unevenly biserrate; rhizome short-creeping, with appressed bicolorous scales, the stipe bases approximate .... 14. *A. obliquum*

gg. Pinnae dull below, usually glaucous beneath, the sterile ones or portions evenly serrate; rhizome often long-creeping, with spreading ± concolorous scales, the stipe bases usually well spaced .... 16. *A. petiolatum*

aa. Blade 2–5 times pinnate.

h. Ultimate segments of blades short- to rather long-stalked, dark color of stalk stopping abruptly at segment base, segments sometimes articulate by a clean break.

i. Rachis, pinna rachises, and/or leaf tissue puberulent or setose.

j. Lamina setose with whitish hairs; indusia setose; rachis and pinna rachises not or only weakly flexuous .... 26. *A. tricholepis*

jj. Lamina glabrous or setose; indusia glabrous; rachis and pinna rachises strongly flexuous .... 9. *A. feei*

ii. Rachis, pinna rachises, and leaf tissue without hairs.

k. Ultimate segments of blades trapeziform, mostly 2.5–5.0 cm long, acute to acuminate at tip; fronds very large, frequently greater than 80 cm long, with stipes stout, 4–6 mm diam. .... 25. *A. trapeziforme*

kk. Ultimate segments flabellate to somewhat rhomboid, rounded to obtuse or truncate at tip; fronds middle-sized, often less than 80 cm long, with stipes mostly less than 4 (5) mm diam.

l. Rhizome scales black, glistening, concolorous, entire, appressed; rhizome usually long-creeping, the stipes well spaced; ultimate segments glaucous beneath, narrowly to occasionally broadly cuneate, usually not abscissing, if abscissing, then tip of stalk not inflated .... 1. *A. andicola*

ll. Rhizome scales castaneous to brown to blackish, if blackish then bicolorous (with lighter margins) and ciliate, appressed to spreading; rhizome short-creeping to suberect; ultimate segments glaucous or not, narrowly to broadly cuneate, abscissing cleanly, the tip of stalk inflated.

m. Rhizome scales small, distinctly bicolorous (center blackish, margins brown) and long-ciliate; margins of sterile segments serrulate; rhizome short-creeping .... 22. *A. tenerum*

mm. Rhizome scales large, concolorous, slightly ciliate; margins of sterile segments subentire or only faintly denticulate; caudex very stout, suberect .... 18. *A. princeps*

hh. Ultimate segments sessile to very short-stalked (1 mm or less), or definitely stalked and dark color of stalk passing into segment base.

n. Blade pedate or digitate-pedate; axes glabrous .... 15. *A. patens*

nn. Blade pinnate; axes glabrous or pubescent-scaly, or hairy.

o. Axes glabrous except for a continuous band of very short dense hairs (less than 0.1 mm long) on abaxial side .... 28. *A. wilesianum*

oo. Axes wholly glabrous or pubescent-scaly on all sides.

p. Blade gradually reduced to apex, mostly 3 or more times pinnate at base; ultimate segments flabellate to suborbicular.

q. Sterile margins of segments sharply serrate, each vein ending in a tooth; rhizome slender, relatively long-creeping .... 3. *A. capillus-veneris*

qq. Sterile margins of segments with each vein ending in a sinus between the definite or indefinite teeth, or margins ± entire; rhizome slender to stout.

r. Pinnae subsessile, usually spreading, acroscopic basal pinnule overlying rachis, on lower pinnae this pinnule dichotomously divided into two ultimate segments .... 5. *A. concinnum* rr. Pinnae, at least the lower ones, definitely stalked, ascending, acroscopic basal pinnule not or hardly overlapping rachis, not dichotomously divided into two ultimate segments.

s. Sori oblong-lunate to linear, few per segment (2–5); segments broadly cuneate at base; rhizome short-creeping, moderately stout; low elevations (750–1350 m) .... 2. *A. braunii*

ss. Sori reniform to suborbicular, usually numerous; segments broadly to narrowly cuneate at base; rhizome short- to long-creeping, moderately stout to slender; low to high elevations.

t. Segments suborbicular; sori frequently with yellow wax; rhizome slender, long-creeping, at least back of more congested apex; middle to high elevations (1600–2700 m) .... 17. *A. poiretii*

tt. Segments flabellate; sori without yellow wax; rhizome short-creeping, compact; lower elevations (800–1350 m) .... 20. *A. raddianum*

pp. Blade with a more or less conform terminal pinna, 2-pinnate (sometimes 3-pinnate in *A. decoratum*) at the base; ultimate segments oblong, rhomboid, or ovate-lanceolate.

u. Stipe and rachis with dense, stiff, spreading, entire, subulate scales .... 6. *A. decoratum*

uu. Stipe and rachis with sparse to moderately dense, twisted, entire to denticulate, ± appressed scales and/or hairs.

v. Terminal pinna larger than the few (1–3) lateral ones and usually broadest at base .... 4. *A. caryotideum*

vv. Terminal pinna about the same size as lateral ones and usually narrowed at base.

w. Pinnules nearest terminal segments usually not greatly reduced, about half as long as longest pinnule.

x. Rhizome rather short-creeping, stout; sterile pinnules coarsely and often unevenly serrate .... 27. *A. villosum*

xx. Rhizome cordlike, very long-creeping; sterile pinnules finely and evenly serrate .... 11. *A. latifolium*

ww. Pinnules nearest the long, acuminate, terminal segment of pinnae greatly reduced, less than half as long as longest pinnule.

y. Sori one per pinnule (rarely 1–2 short additional sori present), on acroscopic edge of fertile pinnules; rhizomes short-creeping, moderately stout; lamina glabrous below, or with a few minute scales .... 19. *A. pulverulentum*

yy. Sori several (3 or more), reniform to oblong, on acroscopic and often distal edges of pinnules.

z. Lamina with tan hairs on veins below; rhizome long-creeping; sori numerous, usually 8 or more per pinnule, these very short-oblong (ca. 1 mm long) .... 23. *A. terminatum*

zz. Lamina glabrous below, or with a few scattered scales; rhizome short-creeping and relatively stout to slender and long-creeping.

a′. Rhizome long-creeping, stipe bases distant; fertile pinnules with sterile tips mostly falcate, acute .... 24. *A. tetraphyllum*

aa′. Rhizome usually short-creeping, often nodose, stipe bases adjacent; fertile pinnules with sterile tips mostly straight and obtuse .... 10. *A. fructuosum*

1. Adiantum andicola Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5) 1:266. 1849.

—Type: Mexico, Oaxaca, Cerro de Sempoaltepec, *Liebmann* [Liebm. Pl. Mex. 2203, Fl. Mex. 434] (C!).

Adiantum amabile Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1: 265. 1849. —Type: Mexico, Oaxaca, "inter Tonaguia et Roayaga," *Liebmann* [Liebm. Pl. Mex. 2206, Fl. Mex. 430, 826 (folio)] (C!). I choose Fl. Mex. 826 as lectotype.

Adiantum cuneatum var. *angustifolium* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):70. 1842. —Lectotype (chosen by Morton, Contr. U.S. Natl. Herb. 38:216. 1973): Mexico, Veracruz, "Pic d'Orizaba," *Galeotti 6266* (BR!).

Adiantum tenerum var. *dissectum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):71. 1842. —Type: Mexico, Veracruz [text], "Oaxaca" [specimen], *Galeotti 6361* (BR!).

Adiantum glaucophyllum Hook., Sp. Fil. 2:40. 1851. —Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:704. 1977): Panama, Veraguas, *Seemann s.n.* (K!).

Adiantum cooperi Baker, J. Bot. 25:25. 1887. —Type: Costa Rica, *Cooper s.n.* (K! photo BM! UC! fragment NY).

Illustrations: Scamman (1960:21, pl. 5, fig. 24); Hooker, Icon. Pl. 10:pl. 961. 1854.

Rhizome long-creeping to occasionally short-creeping, (2) 3–5 mm diam.; rhizome scales black, concolorous, appressed, entire, glistening; fronds mostly 40–90 cm long; stipe 2–4 mm diam., black, glabrous, shining; blade mostly (3) 4 (5)-pinnate, gradually dwindling toward apex; rachis glabrous, straight to slightly flexuous toward tip; ultimate segments flabellate, cuneate at base, symmetrical or not, distal margin with rounded lobes or short-cleft, stalked, color of stalk stopping ± abruptly at segment base, segments articulate or not; leaf tissue dark green, often glaucous beneath, otherwise glabrous on both sides; sori on distal margin, reniform to suborbicular.

Slopes in Montane Rain Forest, Pine-Oak Forest, Pine-Oak-

Liquidambar Forest, Evergreen Cloud Forest; common in Central Plateau, Sierra Madre, uncommon in Northern Highlands (Jitotol Ridge); (1300) 1600–2900 m. Mexico (Mich., Gro., Méx., D.F., Oax., Ver.), Guat., Salv., Nic., C.R., Pan.; Col. Chiapas Collections: *GM 48* (DS); *T 1991* (DS, US); *P 7111* (UC); *EM 218, 224, 5155, 5360* (MEXU, US); *EM 4640* (MEXU, NY); *G 238* (BM, K, NY, PH); *R&R&M 1230* (US); *H&S 20265* (US); *MC 1639* (US); *JTM 1212* (US); *T 4016* (DS); *La 163* (DS); *MC 1833* (US); *8304*; *9333*; *10767*; *11205*; *12814*; *15124*; *21725*; *22104*; *22416*; *22668*; *23177*; *23303*; *26251*; *27700*; *29455*; *31653*; *31830*; *33510*; *33702*; *34596*; *34682*; *41038*; *41336*; *42018*; *42019*; *42579*.

This is the most common species of *Adiantum* in Chiapas, and it and *A. poiretii* are the only ones occurring at high elevations in Chiapas. *Adiantum andicola* is also the most variable species of maidenhair fern in Chiapas, and it may be a species complex. Nearly all collections from the Central Plateau are more or less readily distinguishable from specimens elsewhere in Chiapas by the rather small, narrowly cuneate segments and very long-creeping rhizome. Specimens from other regions of Chiapas generally have larger, more broadly cuneate segments and short-creeping rhizomes. The most aberrant element is represented by collections from the vicinity of Lagos de Monte Bello (*25335*; *32138*; *MC 1833*, US), the Northern Highlands (*32455*), and Sierra Madre (*22693*). These collections have very large, suborbicular segments, and the rhizome seems to be generally short-creeping to suberect with dark brown, non-lustrous rhizome scales. Collections similar to this from other parts of Mexico (Dgo., Sin., Nay., Jal., Mich., Méx., Mlos., Ver., Gro., Oax.), Honduras, and Salvador are labelled *A. hintonii* Maxon & Morton (ined.) in some herbaria.

2. **Adiantum braunii** Mett. ex Kuhn, Linnaea 36:75. 1869.

—Type: Mexico, *Karwinsky s.n.* (presumably B).

Adiantum convolutum Fourn., Mex. Pl. 1:127. 1872. —Syntypes: Mexico, Veracruz, Orizaba, *Bottieri 18*; *Ghiesbreght 406* (isosyntype US!).

Illustrations: see under synonym cited; also Scamman (1960:15, pl. 3, fig. 18).

Rhizome short-creeping; rhizome scales dark brown to blackish, often bicolorous with a blackish central stripe and lighter margins, entire, ± appressed; fronds mostly 50–70 cm long; stipe 1.0–2.5 mm diam., blackish, glabrous, shining; blade 3–4-pinnate, gradually dwindling toward apex; rachis glabrous, ± straight; ultimate segments oblong to suborbicular to flabellate, symmetrical or not, with short blunt lobes on distal margin, broadly to narrowly cuneate at base, not or only slightly cleft, stalked, color of stalk passing into segment base or stopping (but not abruptly) at segment base, segments nonarticulate; margin of sterile segments entire or very faintly denticulate; leaf tissue glabrous on both sides; sori on distal margin, linear-lunate, few (mostly 2–4 per segment), to 5 mm long, indusium brown and hard when mature; $n = 30$ (Jal.).

Canyons and slopes in Tropical Deciduous Forest, Seasonal Evergreen Forest; uncommon in Central Depression, Sierra Madre; 750–1350 m. Western and s Mex. (Sin., Nay., Jal., Mich., Gro., Oax., Ver.), Salv., Nic., C.R.; S.A.? Chiapas Collections: *P 7109* (UC); *T 2932* (DS); *21543*; *28072*; *37603*; *38430*.

3. **Adiantum capillus-veneris** L., Sp. Pl. 2:1096. 1753.

—Lectotype (chosen by Pichi-Sermolli, Webbia 12:678. 1957): LINN 1252.9.

Illustrations: Hooker, Sp. Fil. 2:pl. 74B. 1851; Scamman (1960:15, pl. 3, fig. 17); Tryon (1964:168, fig. 125); Knobloch & Correll, Ferns Chih. 59, pl. 13, figs. 1–2. 1962.

Rhizome short-creeping, 2–4 mm diam.; rhizome scales tan to castaneous, concolorous, entire; fronds mostly 15–45 cm long; stipe reddish brown to atropurpureous, glabrous, shining; blade 2–3-pinnate, gradually dwindling toward apex; ultimate segments symmetrical or not, flabellate, cuneate at base, usually deeply cleft (2 or more clefts per segment) along cartilaginous distal margin, stalked, color of stalk passing into base of segment, segments nonarticulate; sterile segments distinctly serrulate, with veins ending in the teeth; leaf tissue glabrous; sori short, oblong to lunate, along distal margin; $n = 30$ (O.W.), 60 (Fla.).

Along stream banks and wet canyon walls in Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak-Liquidambar Forest, Tropical Rain Forest; common in Central Depression, Northern and Eastern highlands, Central Plateau, uncommon in s Sierra Madre; 350–1300 (1700) m. Nearly throughout w and se U.S., Mex. (Son., Chih., Baja C. S., Dgo., Coah., Tam., N.L., S.L.P., Zac., Mlos., Mich., Oax.), Guat.; S.A. (Ven., Peru); Cuba, P.R., Hisp., L. Antill.; Eur., Afr., Asia. Chiapas Collections: *C&D 123, 204* (US); *R&B 20136* (DS, US); *EM 2423* (K, MEXU, NY, US); *EM 5734* (US); *MC 1769, 2167* (US); *7666*; *22159*; *22349*; *22375*; *23464*; *30335*; *32292*; *32531*; *33395*; *33797*; *34491*.

It is interesting that none of the early collectors of Chiapas ferns gathered this now rather common species; this may indicate that it has been relatively recently introduced, as Tryon (Contr. Gray Herb. 194:166. 1964) suggested for this species in Peru.

According to David Whitacre (Chihuahuan Desert Research Institute, in litt.), *Adiantum capillus-veneris* is used in Chiapas by the white-collared swift (*Streptoprocne zonaris*) to line their nests, "presumably lowering nestling mortality by providing a sturdy substrate for the youngsters' innate clutching response to act on."

4. **Adiantum caryotideum** Christ, Bull. Soc. Bot. Genève (2)1:230. 1909.

—Type: Costa Rica, 1904, *Wercklé s.n.* (P—2 sheets, one fertile, one sterile).

Illustration: Scamman (1960:9, pl. 1, fig. 6).

Rhizome short- to long-creeping, nodose, compact; fronds 50–75 cm long; stipe ca. 3 mm diam., atropurpureous to blackish, shining, with a few scattered scales, glabrescent; blade bipinnate, terminal pinna larger than lateral pinnae, rachis with scattered filiform scales, these often deciduous; pinnae 2–3 lateral pairs, to ca. 15 cm long, 7 cm broad, with ca. 6 pairs of pinnules; terminal pinna ca. 20–25 cm long, 7–15 cm broad, broadest at base, with ca. 9 pairs of lateral segments; segments ovate to ovate-lanceolate, 2.5–4.5 (8) cm long, 1.5–2 (3) cm broad, sterile margin serrate to biserrate, distal segments of a pinna not greatly reduced, apical segment of pinnae hastate, up to 6 cm long, 2 cm broad, stalked 2–5 mm, color of stalk stopping rather abruptly at pinnule base or usually passing into segment base, segments nonarticulate; leaf tissue glaucous below, otherwise glabrous; sori linear-oblong, mostly 3–5 mm long along acroscopic and distal margins.

In Tropical Rain Forest; rare in Eastern Highlands near Guatemala border; 300 m. Southern Mex. (Chis. only), C.R., Pan. CHIAPAS COLLECTIONS: *S 1615a* (MEXU, US); *34205*.

A rather distinct species, not closely related to any other in Mexico.

5. **Adiantum concinnum** Willd., L. Sp. Pl., ed. 4, 5:451. 1810.

—LECTOTYPE (chosen by Tryon, Contr. Gray Herb. 194:168. 1964): Venezuela, Caracas ["Cumana"] *Humboldt & Bonpland s.n.* (B—Herb. Willd. 20099-2; photo GH).

Adiantum lutescens Moug. ex Fée, Gen. Fil. 119. 1852. — TYPE: Mexico, Oaxaca, collector not stated (Herb. Mougeot).

ILLUSTRATIONS: Scamman (1960:18, pl. 4, fig. 19); Tryon (1964:168, fig. 127); Vareschi, Fl. Venez. 1(2):pl. 149. 1969; Kunth, Nov. Gen. et Sp. Pl. 7:pl. 668. 1825; Matuda, Anales Inst. Biol. Univ. Nac. México 27:72. 1956.

Rhizome short-creeping to suberect, compact; rhizome scales castaneous, concolorous, entire; fronds mostly 30–80 cm long; stipe 1–3 mm diam., reddish brown to atropurpureous to blackish, glabrous, shining; blade 2–3-pinnate, gradually dwindling toward apex; rachis glabrous, often somewhat flexuous toward tip; pinnae numerous, spreading to somewhat ascending, subsessile, with acroscopic basal pinnule often dichotomously divided into two ultimate segments, these partially overlapping rachis; ultimate segments often drooping, symmetrical or not, broadly flabellate to suborbicular, with short rounded lobes along distal margin, sometimes also deeply cleft, cuneate at base, stalked, color of stalk passing into base of segment, segments not articulate; margin of sterile segments entire or obscurely serrulate, veins ending in sinuses; leaf tissue yellowish green, glabrous on both sides; sori on distal margin, subrotund to reniform; $n = 57$ (Chis.), 58 (Nay., Jam.), 60 (P.R.).

On slopes, ravines, and bluffs in Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest, Tropical Deciduous Forest, Pine-Oak Forest, occasionally Savannas and in secondary growth, cafetals; common in Northern Highlands, Central Plateau, Sierra Madre, Pacific Coastal Plain, Central Depression; 200–1000 (1600) m. Mexico (Baja C.S., Sin., Nay., Jal., Cma., Méx., Mlos., Mich., Gro., Oax., S.L.P., Ver.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Ven. to Peru); Antill., Trin. CHIAPAS COLLECTIONS: *A 1378* (DS, NY, UC); *GM 26* (DS); *C&D 97, 166, 186* (US); *R 837* (PH); *G 263* (K, NY); *X&S X-420* (US); *T&L 41336* (DS); *EM 4872* (DS); *6220*; *11088*; *20620*; *21551*; *21757*; *21914*; *21916*; *22128*; *22517*; *22917*; *23253*; *23360*; *23406*; *27366*; *28461*; *31566*; *36702*; *37550*; *38415*.

6. **Adiantum decoratum** Maxon & Weatherby, Amer. J. Bot. 19:165. 1932.

—TYPE: Panama, prov. Panama, Río Tapia, *P. C. Standley 26216* (US).

ILLUSTRATION: Scamman (1960:13, pl. 2, fig. 13).

Rhizome short-creeping, nodose, 4–7 mm diam.; rhizome scales light to dark brown, denticulate on margin; fronds 40–90 cm long; stipe 3–4 mm diam., atropurpureous, with dense filiform-subulate spreading scales, these persistent, giving the stipe a shaggy appearance; blade bipinnate (occasionally tripinnate at base), with a conform terminal pinna; rachis clothed like the stipe; pinnae with distal pinnules reduced about half or more the size of largest pinnules, with a small lanceolate apical segment; pinnules oblong, truncate or rounded at tip, not or only barely falcate, the sterile evenly serrulate along distal and acroscopic margins, oblique to spreading, short-stalked, nonarticulate; leaf tissue glabrous on both sides, green to glaucous beneath; sori short-oblong, contiguous, to ca. 8 per pinnule on acroscopic and distal portion of segment.

In Tropical Rain Forest; uncommon in Eastern Highlands near Guatemala border; 300–350 m. Southern Mex. (Tab.), Guat., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *S 1701* (US); *33179*; *34171*.

Two of our three collections have the lower pinnae fully bipinnate at the base. *Adiantum decoratum* can be distinguished from all other species of similar form by the dense spreading scales of the stipe and rachis.

7. **Adiantum deflectens** Mart., Icon. Pl. Crypt. Bras. 94. 1834.

—TYPE: Brazil, prov. Pará, Santarém, *Martius s.n.*

ILLUSTRATIONS: Tryon (1964:179, fig. 135); Martius, Icon. Pl. Crypt. Bras. pl. 56, fig. 2. 1834 [as *A. delicatulum* Mart.].

Rhizome small, short-creeping to erect; frond ca. 8–30 cm long; stipe very slender, reddish brown to atropurpureous, glabrous, shining; blade 1-pinnate, lateral segments (pinnae) cuneate-flabellate, with a similar terminal segment (or in some parts of the range with a prolonged rachis that eventually roots at tip); pinnae stalked, stalk abruptly articulated to blade; sterile segments serrulate (ours) to serrate, fertile segments shallowly cleft into 2–7 lobes; leaf tissue and axes glabrous; sori few, oblong to linear, nearly straight to arcuate.

Slope with Tropical Deciduous Forest; rare in Pacific Coastal Plain; 250 m. Southern Mex. (Oax.), Guat., Hond., Nic., Pan.; S.A. (Col. to Gui. and Peru, Braz., Parag.). CHIAPAS COLLECTION: *27288*.

The sole Chiapas specimen shows no evidence of the rachis being prolonged and rooting at the tip, as is sometimes the case in *A. deflectens*. Also the pinnae are not so sharply serrate as with South American material.

8. **Adiantum dolosum** Kunze, Linnaea 21:219. 1848.

—*Hewardia dolosa* (Kunze) Fée, Gen. Fil. 122. 1852. —TYPE: Surinam, "prope Mariepaston," *Kappler 1766* (LZ, destroyed).

Adiantum wilsonii Hook., Sp. Fil. 2:6, pl. 72A. 1851. — TYPE: Jamaica, near Bath, *Wilson s.n.* (K—3 sheets; photos UC!).

ILLUSTRATIONS: Scamman (1960:9, pl. 1, fig. 1); Hooker, Icon. Pl. 2:pl. 193. 1837 [as *Lindsaea macrophylla* Kaulf.]; Rovirosa, Pterid. Sur Mex. pl. 52. 1909; Vareschi, Fl. Venez. 1(2):pl. 148. 1969.

Rhizome rather long-creeping, 2–3 mm diam.; rhizome scales brown, concolorous, entire to minutely denticulate; fronds mostly 20–35 cm long; stipe 1.5–2.5 mm diam., atropurpureous to blackish, sparsely filiform-scaly to hairy, often glabrescent; blade 1-pinnate with 1–3 (6) pairs of lateral pinnae and a similar but often slightly broader terminal pinna (juvenile fronds sometimes cordate), rachis sparsely to moderately filiform-scaly and hairy; pinnae alternate, entire (sterile serrate), ovate-lanceolate, rounded or subcordate at base, acute at tip, ca. 6–10 cm long, 2.5–4 cm broad, with a short stalk 2–4 mm long, color of stalk passing into pinna base; midrib median, distinct, darkened at base; veins anastomosing toward margin; sori linear, continuous along acroscopic and basiscopic margins, pinna apex sterile and serrate.

In Tropical Rain Forest; uncommon in Northern and Eastern highlands; 300–350 m. Southern Mex. (Chis. only), Guat., Nic., C.R., Pan.; S.A. (Col., Guy., Sur.); Gr. Antill. Chiapas Collections: *EM 3616* (K, MEXU, NY, US); *34185*; *34532*.

Rovirosa (Pterid. Sur Mex. 121. 1909) cited *Martínez s.n.* [Herb. no. 1107], cuenca del Río Lacanjá, Dept. Chilón, as this species; I have been unable to locate the specimen.

9. **Adiantum feei** Moore ex Fée, Mém. Fam. Foug. 7:29, pl. 24, fig. 1. 1857.

—Type: Mexico, Veracruz, near Orizaba, *Schaffner 446* [incorrectly as 44b by Fournier, Mex. Pl. 1:127. 1872] (isotype K!).

Adiantum flexuosum Hook., Second Cent. Ferns pl. 61. 1861. —Type: Guatemala, Baja Verapaz, Santa Rosa, *Salvin s.n.* (K—3 sheets!, photo UC!).

Illustrations: see original and under synonym; also Scamman (1960: 21, pl. 5, fig. 28).

Rhizome short-creeping, 3–6 mm diam.; rhizome scales atropurpureous to blackish with age, concolorous, entire; fronds scrambling, (20) 50–100 or more cm long; stipe mostly 2–3 mm diam., dark reddish brown to atropurpureous, with uniform reddish hairs ca. 0.2 mm long, these sometimes deciduous; blade 3–4-pinnate, gradually dwindling toward apex; rachis (and minor rachises) zig-zag (except on small fronds), rather densely and uniformly short-hairy, hairs reddish, 0.1–0.2 mm long; ultimate segments ± orbicular and symmetrical, ca. 1 cm long and broad, with short rounded lobes on distal margin, broadly cuneate to rounded on proximal margin, segments short-stalked, color of stalk stopping ± abruptly at base of nonarticulate segments; leaf tissue below glabrous or with whitish spreading acicular hairs; sori oblong to lunate, the reflexed segment margin glabrous.

Slopes and ravines in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, occasionally in shrubby second growth; locally common in Northern Highlands, Central Plateau; (550) 1200–1700 m. Southern Mex. (Ver., Oax.), Guat., C.R. Chiapas Collections: *GM 123* (DS, US); *13041*; *14973*; *21160*; *22369*; *23179*; *27815*; *32146*; *32737*; *32838*; *33471*; *34557*; *40965*.

A very distinctive species, likely to be confused with only *A. tricholepis*, which has somewhat flexuous rachises. *Adiantum feei* has a habit peculiar in *Adiantum*: scrambling over low brush.

10. **Adiantum fructuosum** Spreng., Syst. Veg. 4:113. 1827.

—*Adiantum tetraphyllum* Willd. var. *majus* Fourn., Mex. Pl. 1:129. 1872. —Type: Cuba, 1822, *Poeppig s.n.* (isotypes B, L, US).

Illustrations: Scamman (1960:13, pl. 2, fig. 12); Tryon (1964:158, fig. 113).

Similar to *A. tetraphyllum*, differing by the characters given in the key (couplet a′); $n = 60$ (Peru).

Slopes and ravines, in Lower Montane and Montane rain forests, Pine-Oak Forest, Seasonal Evergreen Forest; uncommon in Northern Highlands (but not Jitotol Ridge), Central Plateau, Central Depression, Sierra Madre; 800–1250 m. Southern Mex. (Chis. only?), Guat., C.R., Pan.; S.A. (Ven. to Peru, Braz.); Antill. Chiapas Collections: *GM 33* (DS); *22184*; *22276*; *26354A*; *31511*; *38511*; *38582*; *39999*.

Tryon (1964) discussed the relationship of this species to *A. tetraphyllum*. I am not at all certain that the two are distinct; they seem to be less distinct in Chiapas than in other parts of the range.

11. **Adiantum latifolium** Lam., Encycl. Méth. 1:43. 1783.

—Type: uncertain, but possibly Brazil, *Commerson* (P—JU Cat. 1408, photo US); according to Tryon (Contr. Gray Herb. 194:151. 1964) there is no specimen in P-LA. Proctor (Fl. L. Antill. 2:114. 1977) designated *Proctor 20110* (A), from Guadeloupe, as neotype.

Adiantum lucidum Swartz var. *bipinnatum* Mett. ex Fourn., Mex. Pl. 1:129. 1872. —Lectotype (chosen by Lellinger, Mem. New York Bot. Gard. 23:13. 1972): Mexico, Tabasco, Teapa, *Linden s.n.* (P, photo US).

For additional synonymy, see Mem. New York Bot. Gard. 23:13. 1972.

Illustrations: Scamman (1960:13, pl. 2, fig. 8); Tryon (1964:153, fig. 107); Vareschi, Fl. Venez. 1(2):pl. 145. 1969; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 5, figs. 7–10. 1897 [as *A. intermedium*]; Proctor, Fl. L. Antill. 2:180. 1977.

Rhizome long-creeping, slender, ca. 2 mm diam.; rhizome scales tan to castaneous, sparingly denticulate to entire; fronds 30–70 cm long; stipe 1.5–3.0 mm diam., atropurpureous to blackish, with filiform scales, these often deciduous; blade bipinnate, with a similar terminal pinna, rachis moderately filiform-scaly; pinnae 1–3 lateral pairs with distal segments not greatly reduced, about half length of longest pinnules, apical segment hastate, acuminate; ultimate segments sessile to subsessile, oblong-lanceolate, excised on basiscopic margin, rounded to acutish at apex, margin of sterile segments evenly serrulate; midvein of segments usually distinct; leaf tissue glabrous on both sides, glaucous below; sori oblong-linear, contiguous, on all but excised portion of segment; $n = 60$, $2n = 120$ (Jam.).

Slopes in Tropical Rain Forest, coffee-cacao plantations; uncommon in Northern and Eastern highlands, s Pacific Coastal Plain, Gulf Coastal Plain; 100–550 m. Southern Mex. (Oax., Ver., Tab.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol., Braz., Parag.); Antill., Trin. Chiapas Collections: *EM 3678* (MEXU, US); *Fi 35388* (NY); *M&M 899* (WIS); *Ch 2083* (MEXU); *31595*; *34142*; *35043*.

A distinct Mexican undescribed variety of *A. latifolium* occurs on the western coast of Mexico in the states of Nay., Jal., and Oax. It can be distinguished by the generally broader segments and rounder segment tips.

12. **Adiantum lunulatum** Burm. f., Fl. Ind. 235. 1768.

—Type: India, Malabar Coast, collector not stated (G). For discussion, see Verma (Nova Hedwigia 3:463–468. 1961).

Adiantum lunatum Cav., Descr. Pl. 272. 1802. —*Adiantum arcuatum* Swartz, Syn. Fil. 122. 1806. —Syntypes: Marianas, Philippines, and Mexico (Acapulco), *Née* (MA?, not seen by Christensen, Dansk. Bot. Ark. 9:25. 1937).

Illustrations: Holttum, Fl. Malaya, 2, Ferns 601, fig. 350. 1954; Scamman (1960:18, pl. 4, fig. 22); Pichi Sermolli, Webbia 12:667. 1957; Hooker & Greville, Icon. Fil. 1:pl. 104. 1829.

Rhizome short, erect to suberect; fronds mostly 15–60 cm long, arching; stipe mostly 0.7–1.5 mm diam., reddish brown to nearly blackish, glabrous, shining; blade 1-pinnate, lateral segments (pinnae) semilunate, upper and outer edges forming a continuous and almost even curve (apart from lobing), lower margin straight to incurved, distal segments broadly cuneate, with a cuneate-flabellate terminal segment, or rachis prolonged, without pinnae, eventually rooting at tip; pinnae stalked, stalks up to 2 (4) cm long, abruptly articulate to segment; sterile segments deeply cleft into numerous rounded lobes, fertile segments shallowly to deeply cleft; leaf tissue and axes glabrous, texture thin; sori oblong to linear, straight to arcuate; $n = 30$, $2n = 60$, sexual (India); also $n = 2n = 60$, '90', apogamous (India).

Wet banks, wooded slopes, occasionally on rocks, in Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak Forest; locally common in Pacific Coastal Plain, Central Depression, and where that adjoins the Sierra Madre; 180–1100 m. Western and s Mex. (Sin., Cma., Nay., Gro., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col., Braz.?); Cuba; O.W. trop. CHIAPAS COLLECTIONS: *P 6744* (UC, US); *Fi 35386* (NY, US); *22516*; *25613*; *27004*; *30717*; *37604*; *38433*; *38592*; *40088*.

This species has recently gone under the name *Adiantum philippense* L. (Sp. Pl. 2:1094. 1753), based on a Petiver illustration (Gazophylacii Naturae et Artis decas prima pl. 4, fig. 4. 1702), but Verma (Nova Hedwigia 3:463–468. 1961) was of the opinion that this plate is so poor that the name *A. philippense* cannot be typified. For a different opinion, see Pichi-Sermolli (Webbia 12:665–669. 1957).

13. **Adiantum macrophyllum** Swartz, Prodr. Veg. Ind. Occ. 135. 1788.

—TYPE: Jamaica, *Swartz s.n.* (S).

ILLUSTRATIONS: Scamman (1960:9, pl. 1, fig. 2); Tryon (1964:147, fig. 100); Vareschi, Fl. Venez. 1(2):pl. 148. 1969; Kunth, Nov. Gen. et Sp. Pl. 7:pl. 666. 1825; Hooker & Greville, Icon. Fil. 2:pl. 132. 1829.

Rhizome short-creeping, moderately stout, ca. 5–8 mm diam.; rhizome scales brown, concolorous, entire; fronds (30) 40–75 cm long; stipe 2–3 mm diam., blackish, glabrous, shining; blade 1-pinnate with a hastate apical pinna; pinnae usually opposite, entire (sterile pinnae often crenately lobed), mostly 4–7 pairs, 6–12 cm long, 2–4.5 cm broad, triangular, broadly cuneate at base (lowermost commonly truncate or subcordate at base, auriculate or biauriculate), acute to acuminate at sterile serrate tip, sessile or short-stalked to 3 mm, color of stalk passing into base of segment, pinnae nonarticulate; leaf tissue glabrous on both sides, glaucous or dull beneath; sori linear, usually continuous to sometimes interrupted along both acroscopic and basiscopic margins; $n = 30$, $2n = 60$ (Jam.).

Slopes and ravines in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; scattered in Eastern and Northern highlands (but not Jitotol Ridge), NE edge of Central Plateau; 300–900 m. Southern Mex. (Ver., Pue., Gro., Oax.), Bel., Guat., Salv., Nic., C.R., Pan.; S.A. (Col. to Gui. and Bol., Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *GM s.n.* (DS, US); *S 1695* (MEXU, US); *C&D 248* (US); *R 865* (PH); *22133*; *29858*; *31510*; *32833*; *32987*; *34011*; *42000*.

Rovirosa 865 is very atypical in having the lowest pairs of pinnae pinnate and nine pairs of lateral pinnae.

14. **Adiantum obliquum** Willd., L. Sp. Pl., ed. 4, 5:429. 1810.

—LECTOTYPE (chosen by Lellinger, Mem. New York Bot. Gard. 23:13. 1972): Venezuela, Caracas, *Bredemeyer* (B—Herb. Willd. 20067-1, photos BM, GH, US).

For additional synonymy, see Lellinger, loc. cit.

ILLUSTRATIONS: Scamman (1960:9, pl. 1, fig. 4); Tryon (1964:147, fig. 106).

Rhizome short-creeping, 3–4 mm diam.; rhizome scales castaneous, ± appressed, entire; fronds 20–60 cm long; stipe 1.0–2.5 mm diam., atropurpureous to blackish, deciduously filiform-scaly; blade 1-pinnate (ours) to infrequently 2-pinnate, if latter then apical pinna largest; rachis persistently filiform-scaly; pinnae ovate-lanceolate, inequilateral, excised basiscopically, rounded or subauriculate acroscopically, acuminate at apex, mostly 3–6 cm long, sterile pinnae biserrate; pinnae stalked, stalk 2–5 mm long, color passing into base of nonarticulate pinnae; midvein evident; leaf tissue dark green, glabrous, not glaucous below; indusia linear to lunate, on both sides of pinna except at excised portion.

In Tropical Rain Forest; uncommon in Eastern Highlands, near Guatemala border; 300–350 m. Southern Mex. (Oax.?), Bel., Nic., C.R., Pan.; S.A. (Col. to Gui. and Bol., Braz.); Antill. CHIAPAS COLLECTIONS: *33136*; *34143*.

Closely related to *A. petiolatum*, which see.

15. **Adiantum patens** Willd., L. Sp. Pl., ed. 4, 5:439. 1810.

—TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 20078, photo GH; isotype W).

ILLUSTRATIONS: Tryon (1964:163, fig. 124); Hooker, Sp. Fil. 2:pl. 87A. 1851; Vareschi, Fl. Venez. 1(2):pl. 150. 1969; Matuda, Anales Inst. Biol. Univ. Nac. México 27:69. 1956.

Rhizome short-creeping; fronds 20–75 cm tall, arching; stipe mostly ca. 2 mm diam., light to dark reddish brown, glabrous; blade 2–3-pinnate, nearly circular in outline, rachis forking 2–3 times and giving rise to progressively shorter acroscopic pinnules; penultimate segments 11–25 cm long to ca. 4 cm broad; ultimate segments oblong, rounded to truncate at tip, serrate to weakly lobed on acroscopic and distal margins, entire on basiscopic margin, basal segments of penultimate segments reduced, cuneate-flabellate; segments short-stalked, color of stalk passing into blade; leaf tissue and axes glabrous or with scattered septate hairs on veins below (ours); sori lunate to reniform-orbicular, borne on distal and acroscopic edges.

Slopes with Tropical Deciduous Forest, rarely Evergreen Cloud Forest; uncommon in Pacific Coastal Plain and lower (rarely middle) elevations of Sierra Madre, Central Depression; 700–1000 (2000) m. Western Mex. (Son., Sin., Dgo., Nay., Cma., Jal., Mich., Gro., Mlos., Méx., Oax.), Guat., Salv., C.R.; S.A. (Ven. and Col. to Bol.). CHIAPAS COLLECTIONS: *P 6743* (NY, UC, US); *P 7113* (UC); *C&D 166a* (US); *22574*; *39130*; *42615*.

16. **Adiantum petiolatum** Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:326. 1811.

—TYPE: "habitat in Gallia aequinoctiali Brasilioque," not found at P by Tryon, 1964.

Adiantum kaulfussii Kunze, Linnaea 21:221. 1848. —LECTOTYPE (chosen by Tryon, Contr. Gray Herb. 194:149. 1964): Fl. Martinique 371, *Sieber* (isotype B).

Adiantum lucidum (Cav.) Swartz var. *pinnatum* Fourn., Mex. Pl. 1:129. 1872. —LECTOTYPE (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:704. 1977): Mexico, Tabasco, *Linden s.n.* (P, Morton photo 2605, US).

ILLUSTRATIONS: Scamman (1960:9, pl. 1, fig. 5); Tryon (1964:147, fig. 105).

Similar to *A. obliquum*, differing by the characters given in the key (couplet g); $2n = 60$ (Braz.).

Ravines; uncommon in Gulf Coastal Plain; 112 m. Southern Mex. (Oax., Tab.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Gui. and Bol., Braz.); Antill., Trin. Chiapas Collections: *R 49* (US); *G 412* (K, NY, pt.).

Matuda 18437 (DS, MEXU, US) is either this species or *A. obliquum*; the specimens are rather poor, and I cannot be certain.

I am not convinced that *A. petiolatum* is distinct from *A. obliquum*. The characters distinguishing them seem rather weak. Glaucous and nonglaucous forms are known in several species of *Adiantum*. Also rhizome habit is variable depending on the habitat. It is curious that both species have nearly exactly the same ranges and apparently occupy identical habitats, often growing together.

17. **Adiantum poiretii** Wikstr., Vet. Akad. Handl. 1825:443. 1826.

—*Adiantum crenatum* Poir. *in* Lam., Encycl. Méth. Suppl. 1:137. Sept. 1810 (not Willd., Mar. 1810). —Type: Tristan da Cunha, *Petit-Thouars* (P—JU 1427, photo BR!).

Adiantum thalictroides Willd. ex Schlecht., Adumbr. Pl. 5:53. 1832. —Type: Mauritius, *Petit-Thouars* (B—Herb. Willd. 20101).

Adiantum pellucidum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):72, pl. 19. 1842. —Type: Mexico, Oaxaca, "cordillère de Yavezia aux ravins brûlants de Tanetze et de Talea" ["Llano Verde," isotype], *Galeotti 6461* (BR! isotypes BR! K!).

Adiantum gratum Fée, Gen. Fil. 119. 1852. —Type: Mexico, Oaxaca, "prope Nolasco," *Galeotti 6542* (presumably P).

Illustrations: Scamman (1960:18, pl. 4, fig. 21); Tryon (1964:174, fig. 129); Fée, Mém. Fam. Foug. 7:pl. 12, fig. 3, 1857; Pichi Sermolli, Webbia 12:689. 1957; Knobloch & Correll, Ferns Chih. 62. 1962.

Rhizome usually long-creeping, slender (ca. 2 mm diam.); rhizome scales castaneous, concolorous, entire to short-ciliate; fronds ca. 20–60 (75) cm long; stipe mostly 1–2 mm diam., dark reddish brown to atropurpureous, glabrous, shining; blade (2) 3 (4)-pinnate, the ultimate segments suborbicular to broadly flabellate, ± symmetrical, distal margin with short rounded lobes, proximal margin ± entire, broadly to narrowly cuneate; ultimate segments stalked, color of stalk passing into base of segment, segments not readily articulate; leaf tissue and axes glabrous; sori reniform to lunate-orbicular, indusia often yellowish-waxy on inner face; $n = 57$ (Afr.).

Slopes with Montane Rain Forest, Pine-Oak-Liquidambar Forest, infrequently Evergreen Cloud Forest; scattered in Central Plateau, Northern Highlands (Jitotol Ridge), s Sierra Madre; 1600–2700 m. Mex. (Son., Chih., Sin., Baja C.S., Jal., Cma., Méx., D.F., Mlos., S.L.P., Hgo., Ver., Mich., Gro., Pue., Oax.), Guat., C.R.; S.A. (Ven. to Bol., Arg., Chile); Hisp., Cuba?; Afr., India. Chiapas Collections: *C&D 134* (US); *T 42* (DS); *T&L 41082* (DS); *7398*; *21407*; *22694*; *23178*; *31718*; *31942*; *32021*; *32332*.

Pichi-Sermolli (Webbia 12:687–696. 1957) and some other authors have regarded *A. poiretii* as endemic to Tristan da Cunha; if so, the earliest name for the wide-ranging species from Africa and America would be *A. thalictroides*.

18. **Adiantum princeps** Moore, Gard. Chron. (n.s.) 4:197, figs. 43, 44. 1875.

—Type: described from cultivated material originally received from Colombia, Hort. Veitch, 1875, no. 16, Thomas Moore's Fern Herbarium (K—2 sheets!, photo BM! US).

Illustration: Scamman (1960:21, pl. 5, fig. 26).

Rhizome suberect, stout, caudex 1.5–2.5 cm diam.; rhizome scales orangish to ferruginous, concolorous, short-ciliate, to 1 cm long, in a dense conspicuous tuft at apex; fronds large, usually (60) 75–130 cm long; stipe 3–5 mm diam., atropurpureous to blackish, glabrous, shining; blade 3–4-pinnate; ultimate segments symmetrical to asymmetrical, rhomboid to less often flabellate, broadly cuneate at base, acroscopic and/or distal margins with short rounded lobes, little or not at all incised (except for sterile segments), stalked, color of stalk stopping very abruptly at segment base, segments readily articulate; margins of sterile segments subentire; sori on distal and acroscopic margins, lunate to reniform.

Slopes and canyons in Seasonal Evergreen Forest, Tropical Deciduous Forest, less often Pine-Oak Forests, Savannas, and cafetals; common in Sierra Madre, Pacific Coastal Plain, Central Depression; 200–1000 m. Western Mex. (Sin., Nay., Jal., Mich., Gro., Oax.), Salv., Nic., C.R., Pan.; Col. Chiapas Collections: *Mi 5463* (MEXU); *20618*; *22529*; *22559*; *23439*; *23743*; *25590*; *26884*; *27003*; *28485*; *36705*; *37680*; *38419*; *38434*; *38589*.

This is one of the largest species of *Adiantum* in Mexico. More than any other species, it has readily articulate segments, so much so that one often finds only skeletonized specimens in herbaria. As Morton (1955) pointed out, it is very different from *A. tenerum*, with which it has been confused.

19. **Adiantum pulverulentum** L., Sp. Pl. 2:1096. 1753.

—Lectotype (chosen by Proctor, Fl. L. Antill. 2:185. 1977): Plumier's Descr. Pl. Amer. pl. 47. 1693 (=Tract. Fil. Amer. pl. 55. 1705), illustrating a plant from either Martinique or Hispaniola.

For additional synonymy, see Lellinger, loc. cit.

Illustrations: Scamman (1960:15, pl. 3, fig. 14); Tryon (1964:158, fig. 114); Vareschi, Fl. Venez. 1(2):pls. 147, 148. 1969.

Rhizome short-creeping, moderately stout, caudex ca. 5–8 mm diam.; fronds mostly (30) 50–100 cm long; stipe 2–4 mm diam., atropurpureous, persistently filiform-scaly and hairy; blade 2-pinnate; rachis and costae persistently filiform-scaly and hairy, scales tan, denticulate; pinnae (1) 4–8 lateral pairs and a conform terminal one, 9–22 cm long, lateral ones spreading; distal pinnules of a pinna greatly reduced toward pinna apex, less than half as long as longest ones, pinna apex acuminate-attenuate; sterile pinnules and sterile tips of fertile pinnules coarsely serrate; leaf tissue dark green, glabrous below or with scattered linear scales with a stellate base, not glaucous; sori long, one per pinnule on acroscopic side, infrequently with an additional 1–2 shorter sori beyond the linear one; indusia glabrous; $n = 30$, $2n = 27\text{II} + 36\text{I}$ at meiosis (Jam.).

Slopes and stream banks, also cafetals, in Seasonal Evergreen Forest, Tropical, Lower Montane, and Montane rain forests; common in Eastern and Northern highlands (but not Jitotol Ridge), s Pacific Coastal Plain, rare in Central Depression and Central Plateau; 200–800 (1350) m. Southern Mex. (Oax., S.L.P., Ver., Tab.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *GM 144* (DS, US); *P 6864* (UC, US); *P 7236* (UC, NY); *R 52* (PH, US); *S 1700* (MEXU, US); *EM 184* (MEXU, US); *G 449* (K, NY, PH); *R&R&M 13558* (US); *21871*; *22260*; *22457*; *22472*; *22509*; *29142*; *31589*; *32806*; *33025*; *33177*; *33890*; *34170*; *34195*; *34467*; *34975*; *38155*; *38241*; *38671*.

Adiantum pulverulentum, A. fructuosum, A. tetraphyllum, A. terminatum, A. decoratum, and numerous others from Central and South America form a natural group of closely related species within *Adiantum*. All of these species occur in the same general habitat: low elevation rain forests, especially along streams. Within this group, *A. pulverulentum* is one of the more easily characterized species. Nevertheless, occasional specimens will be found that are more or less intermediate between *A. pulverulentum* and one of the other species in this group. Such specimens from Chiapas are *C&D 170* (US), *27451*, and *34993*. All of these tend toward *A. fructuosum* and *A. tetraphyllum* in having more than one sorus per pinnule. At present, I can interpret these intermediates only as hybrids. At least one of these specimens (*C&D 170*) seems to have abortive spores.

20. **Adiantum raddianum** Presl, Tent. Pterid. 158. 1836.

—TYPE: based on Raddi, Pl. Bras. 1:pl. 78, fig. 2. 1825.

Adiantum cuneatum Langsd. & Fisch., Icon. Fil. 23, pl. 26. 1810 (not Forst., 1786). —TYPE: Brazil, St. Catharina, *Langsdorff s.n.* (LE, photo GH; isotype BM).

ILLUSTRATION: Tryon (1964:168, fig. 128).

Similar to *A. capillus-veneris*, but differing by the rhizome short-creeping, more compact; rachis ± flexuose toward tip; ultimate segments more often symmetrical, broadly flabellate, deeply cleft or not; margin of sterile segments with rounded lobes, lobes subentire to usually faintly serrulate, veins ending in sinuses.

Cliff faces and bluffs in Tropical Deciduous Forest, Seasonal Evergreen Forest; uncommon in Central Depression; 800–1350 m. Southern Mex. (Chis. only?), Nic., C.R.; S.A. (Col., Peru, Bol., Braz., Urug., Parag.). CHIAPAS COLLECTIONS: *21589*; *27375*.

21. **Adiantum seemannii** Hook., Sp. Fil. 2:5, pl. 81A. 1851.

—TYPE: Panama, Veraguas, San Lorenzo, *Seemann 1124* (K!—photo UC!).

ILLUSTRATIONS: Scamman (1960:9, pl. 1. fig. 3); Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 9, figs. 4–5. 1897 [as *A. platyphyllum*].

Rhizome short-creeping, nodose, rather compact; rhizome scales castaneous, concolorous, entire to minutely denticulate; fronds mostly 30–50 cm long; stipe 1.0–1.5 mm diam., atropurpureous to black, glabrous; blade 1-pinnate (infrequently 2-pinnate further south) with 1–4 pairs of lateral pinnae and a conform apical pinna; pinnae serrate (sterile) to entire (fertile), broadly ovate, mostly 5–10 cm long, 2.5–6.0 cm broad, rounded at base, acuminate at apex, long-stalked, the stalk 1–3 cm long, color of stalk stopping abruptly at pinna base, pinnae not articulate; veins free; leaf tissue glabrous, often glaucous beneath; sori linear, usually interrupted (but contiguous), in lengths of mostly 5–15 mm on both sides of pinna, especially near base.

Slopes in Tropical Rain Forest; uncommon in Eastern Highlands, s Pacific Coastal Plain; 300–450 m. Mexico (Chis. only), Guat., C.R., Pan.; Col. CHIAPAS COLLECTIONS: *S 1615* (MEXU, US); *31586*; *34206*.

22. **Adiantum tenerum** Swartz, Prodr. Veg. Ind. Occ. 135. 1788.

—TYPE: uncertain; "Brown. jam. 88" and "Pluk. phyt. t. 254, f-1" from "Jamaica, Hispaniola" cited, but presumably based on a collection from Jamaica by *Swartz*.

Adiantum trapezoides Fée, Gen. Fil. 117. 1852. —TYPE: Mexico, Veracruz, Puente Nacional, *Galeotti 6317* (P).

? *Adiantum extensum* Fée, Mém. Fam. Foug. 8:72. 1857. —SYNTYPES: Mexico, Veracruz, near Orizaba and Huatusco, *Schaffner 40* and *41*.

ILLUSTRATIONS: Scamman (1960:21, pl. 5, fig. 25); Vareschi, Fl. Venez. 1(2):pl. 146. 1969; Rovirosa, Pterid. Sur Mex. pl. 10. 1909.

Rhizome short-creeping; rhizome scales ferruginous to dark brown, concolorous to usually bicolorous with a darker central stripe, short- to long-ciliate on margin; fronds 30–90 cm long; stipe 1–3 mm diam., atropurpureous to blackish, glabrous, shining; blade mostly (3) 4 (5)-pinnate, gradually dwindling toward apex; rachis glabrous, somewhat flexuous toward tip; ultimate segments ± symmetrical to somewhat asymmetrical, flabellate to rhomboid-flabellate, cuneate at base, sterile segments often cleft, fertile little or not at all cleft, stalked, color of stalk stopping very abruptly at segment base, segments articulate, leaving a stalk that is flared and cupulelike at tip; distal margin of sterile segments serrulate, veins ending in teeth; leaf tissue dark green, glabrous, glaucous or not; sori on distal margin, lunate to reniform; $n = 30$ (Ver., C.R., Jam., Fla.).

Cliff faces, slopes, and ravines in Seasonal Evergreen Forest, Tropical Deciduous Forest, Tropical, Lower Montane, and Montane rain forests, Pine-Oak Forest; common in Eastern and Northern highlands (but not Jitotol Ridge), uncommon in Central Plateau; 300–1350 (1700) m. Eastern and s Mex. (N.L., Tam., S.L.P., Hgo., Ver., Pue., Oax., Yuc.), Guat., Hond., Nic., C.R.; Ven.; Fla., Antill., Trin. CHIAPAS COLLECTIONS: *S 1601* (MEXU, US); *Dr 1614* (MEXU, GH, US); *GM 187* (DS); *C&D 240* (US); *21587*; *22427*; *23073*; *29050*; *29092*; *32571*; *32578*; *32832*; *33056*; *33221*; *33341*; *33428*; *33808*; *33917*; *34146*; *37167*.

Easily distinguished from *A. princeps* by the usually longer-ciliate, bicolorous rhizome scales, the serrulate sterile segments, and the generally more flabellate segments. In Chiapas, these two species do not grow together, *A. tenerum* being found on the Atlantic slope, *A. princeps* on the Pacific slope.

23. **Adiantum terminatum** Kunze ex Miq., K. Nederl. Inst. Wetensch. Letterk. Schoone Kunsten, Amsterdam ["Het Instituut"] 1842:187. 1843.

—TYPE: Surinam, Bergendaal, *Focke* (U).

ILLUSTRATION: Tryon (1964:158, fig. 117).

Similar to *A. tetraphyllum*, differing from that in rachis and costae below bearing nearly all simple trichomes (with or without a flared base); leaf tissue below with scattered simple trichomes; indusia with short trichomes. Rhizome short-creeping to long-creeping (ours), ca. 3 mm diam.; lateral pinnae few, mostly 2–3 pairs, ascending; distal segments of pinnae greatly reduced; leaf tissue relatively thin; sori numerous, small, roundish to short-oblong, usually 8 or more per pinnule, borne on upper and also often outer edges.

Along wet slopes and small streams in Tropical and Montane rain forests; scattered in Eastern Highlands, SE corner of Central Plateau; 300–1250 m. Southern Mex. (Chis. only), Guat.; S.A. (Col. to Gui. and Bol., Braz.); Trin. Chiapas Collections: *13558?*; *26534*; *29886*; *32898*; *38988*.

Of our species, most closely allied to *A. tetraphyllum*.

Two collections from the Northern and Eastern highlands (*26564*, *34117*) are similar in size, texture, sori, and indusia to *A. terminatum*, but they have denticulate, castaneous scales on the axes, and scales and hairs on the leaf tissue below. I have seen similar collections from other parts of Central America and northern South America. These may represent an undescribed species.

24. **Adiantum tetraphyllum** Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:441. 1810.

—Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:704. 1977): Venezuela, near Guanaguana and Caripe, *Humboldt & Bonpland* (B—Herb. Willd. 20082-2).

Illustrations: Scamman (1960:13, pl. 2, fig. 11); Tryon (1964:158, fig. 112).

Rhizome long-creeping, ca. 3–5 mm diam.; fronds ca. 50–75 cm long; stipe ca. 2 mm diam., atropurpureous, persistently filiform-scaly and hairy; blade 2-pinnate; rachis and costae persistently filiform-scaly and hairy, the scales tan, denticulate; pinnae mostly 2–4 lateral pairs and a conform terminal one, lateral ones commonly ascending; distal pinnules of a pinna greatly reduced toward pinna apex, less than half as long as longest ones, pinna apex acuminate-attenuate; sterile pinnules and sterile tips of fertile pinnules coarsely serrate or biserrate, the tips falcate; leaf tissue dark green, glabrous below or with scattered linear scales with a stellate base, not glaucous; sori oblong to oblong-lunate, mostly ca. 3–6 per pinnule along acroscopic side; indusia glabrous; $n = 58–60$ (Jam.).

Ravines and stream banks, in Seasonal Evergreen Forest, Lower Montane Rain Forest; uncommon in Pacific Coastal Plain, lower elevations of Sierra Madre, Central Depression, Eastern Highlands; 500–850 m. Southern Mex. (Gro., Oax., Ver.), Bel., Guat., Nic., C.R.; S.A. (Ven., Peru, and probably elsewhere); Antill., Trin. Chiapas Collections: *P 6864*, pt. (NY, US); *P 6742* (UC, US); *EM 18398* (DS, MEXU); *37681*; *42001*.

Most closely related to *A. fructuosum* and *A. terminatum*, which see for additional discussion. In all likelihood, *A. tetraphyllum* as commonly construed represents a species complex (see Kramer, Acta Bot. Neerl. 3:481–486. 1954). There is a very wide variety of material going under this name in herbaria, so it is difficult to get an accurate idea as to its range.

25. **Adiantum trapeziforme** L., Sp. Pl. 2:1097. 1753.

—Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:704. 1977): Sloane's "Voyage to the islands of Madera . . . and Jamaica" pl. 59. According to Lellinger LINN 1252.13 is *A. tenerum*.

Illustrations: Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 6, figs. 6, 7. 1897; Scamman (1960:pl. 5, fig. 27).

Rhizome stout, compact, short-creeping to suberect; fronds 60–120 cm long; stipe 4–6 mm diam., blackish, glabrous, shining; blade 3–4-pinnate at base, becoming 2-pinnate distally, ultimate segments trapeziform, asymmetrical, acute to acuminate at tip, fertile segments with short truncate lobes on distal and acroscopic margins (sterile segments serrulate on these margins), basiscopic and proximal margins entire; penultimate segments with a large hastate apical segment; ultimate segments mostly 2–5 cm long, 1–2 cm broad, stalked, color of stalk abruptly ending at base of segment but segments not articulate; leaf tissue and axes glabrous, lamina sometimes subglaucous below; sori oblong, along distal and acroscopic edges; $n = 30$, $2n = 60$; $2n = 90$ (cult.?).

Slopes and sink-holes with Seasonal Evergreen Forest, Lower Montane and Montane rain forests, Pine-Oak Forest; scattered in Northern Highlands (but not Jitotol Ridge), lower elevations of Central Plateau, Pacific Coastal Plain, Central Depression, and lower elevations of Sierra Madre; 200–1100 m. Southern Mex. (Tam., S.L.P., Ver., Hgo., Méx., Mich., Gro., Jal., Oax.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A.?; Gr. Antill. Chiapas Collections: *GM 33* (DS); *G 399* (K, NY); *EM 190* (MEXU); *EM 17346* (MEXU); *C&D 216* (US); *22119*; *22262*; *22459*; *22525*; *32808*; *33781*; *38095*; *38583*; *39061*; *40055*.

Rovirosa 215 (PH), "entre Ixtacomitan y Tescubia" is very atypical in having rather deeply incised segments and segments not so abruptly articulate or trapeziform.

South American material referred to this species is mostly (entirely?) not the same as material from Mexico and Central America.

26. **Adiantum tricholepis** Fée, Mém. Fam. Foug. 8:72. 1857.

—Type: Mexico [Jalisco], Río Grande de Lerma, near Guadalajara, *Galeotti 6445* (presumably P; isotypes BR!).

Adiantum fragile Swartz var. *pubescens* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):72. 1842. —Type: Mexico, Jalisco, Río Grande de Lerma, N of Guadalajara, *Galeotti 6445* (BR!); isotype BR!, photo BM!).

Adiantum chilense Kaulf. var. *pilosulum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5) 1:115. 1849. —Type: Mexico, Veracruz, Papantla, *Liebmann s.n.* (not found at C; isotype US).

Illustrations: Knobloch & Correll, Ferns Chih. 59, pl. 13, figs. 3–4. 1962; Matuda, Anales Inst. Biol. Univ. Nac. México 27:70. 1956.

Rhizome short-creeping to suberect, compact, caudex to 1.3 cm diam.; rhizome scales tan to dark-castaneous, concolorous, entire or sparingly denticulate (ours); fronds (30) 45–70 cm long; stipe 1–2 mm diam., atropurpureous to nearly blackish, shining; blade 3–4-pinnate at base, bipinnate distally, rachis zig-zag, glabrescent or often with reddish hairs, ultimate segments suborbicular, ± symmetrical, distal margin rounded (serrulate in sterile segments), proximal margin rounded to broadly cuneate to subcordate; ultimate segments small, mostly ca. 1 cm broad and long (or less), stalked, color of stalk ending ± abruptly at base of segment; segments articulate with age; leaf tissue on both sides hirsute with stiff spreading acicular whitish hairs; sori linear to slightly lunate, the reflexed segment margin hirsute.

Steep canyons and dry slopes, (also secondary growth slopes) in Seasonal Evergreen Forest, Tropical Deciduous Forest; uncommon in Central Depression, drier areas of Northern Highlands; 600–1000 m. Texas, Mex. (Son., Chih., Dgo., Sin., Nay., Jal., Coah., Tam., N.L., S.L.P., Ver., Cma., Mich., Gro., Méx., Mlos., Oax., Camp., Yuc.), Bel., Guat. Chiapas Collections: *GM 72* (DS, US); *GM 189* (DS); *20173*; *27241*; *27403*; *29049*.

27. **Adiantum villosum** L., Syst. Nat., ed. 10. 2:1328. 1759.

—Type: LINN 1252.10 (photo: A) may be this species but is not typical; Proctor (Fl. L. Antill. 2:185. 1977) believed this specimen to be *A. pulverulentum* and selected a specimen in the Sloane Herbarium (BM-Sloane Herb. 1:127) as neotype of *A. villosum*.

Illustration: Scamman (1960:9, pl. 1, fig. 7); Tryon (1964:153, fig. 109); Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 9, figs. 6–11. 1897.

Rhizome short-creeping, moderately stout (ca. 7 mm diam.); rhizome scales castaneous to atropurpureous, concolorous, short-ciliate; fronds (35) 60–100 cm long; stipe 2–5 mm diam., dark reddish brown to blackish, with hairs and narrow scales, these sometimes deciduous; blade bipinnate with a ± conform terminal pinna, with rachis persistently pubescent-scaly; pinnae with distal segments not greatly reduced, about half the size of largest pinnules or larger, apical segment ± hastate, acuminate; ultimate segments trapeziform to rhombic, asymmetrical, acroscopic margin of sterile segments serrate, coarsely so toward tip, basiscopic margin entire, apex acute (sterile segments) to sometimes truncate (fertile segments), sessile or nearly so; leaf tissue glabrous, green; veins below with scattered hairs and filiform scales; sori oblong, mostly along acroscopic and distal margins.

Slopes along streams, Tropical and Lower Montane rain forests, Seasonal Evergreen Forest; uncommon in Northern and Eastern highlands, Central Depression, s Pacific Coastal Plain; 300–800 m. Southern Mex. (Oax., Ver., Tab.), Bel., Guat., Salv., Nic., C.R.; S.A. (Ven. and Col. to Peru, Braz.?); Antill. Chiapas Collections: *EM 18526* (MEXU, US); *S 1701a* (MEXU, US); *Fi 35400* (NY, US); *GM s.n.* (DS); *32577*; *33178*; *33891*; *38242*; *38524*; *38526*.

Specimens of *A. villosum* without rhizomes are sometimes difficult to distinguish from *A. latifolium*. The latter is totally glabrous on the pinnules below and is often more glaucous; also the sterile pinnules are evenly serrulate.

28. **Adiantum wilesianum** Hook., Sp. Fil. 2:50, pl. 83C. 1851.

—Syntypes: Jamaica, *Wiles s.n.* (in Herb. J. Smith, BM, photo UC!); Mexico, Tabasco, *Linden,* Fil. n. 1903 (K).

Illustration: **Fig. 4.**

Rhizome not seen, probably stout, compact, short-creeping; fronds 75–100 or more cm long; stipe 4–6 mm diam., blackish, shining; blade 3–4-pinnate at base, bipinnate distally, ultimate segments oblong-trapeziform, asymmetrical, acroscopic margin crenate or with shallow, truncate lobes, rounded to acutish at apex, ± entire along basiscopic margin; ultimate segments sessile or with a very short stalk 1 mm long or less, color of stalk passing into base of segment, segments nonarticulate; axes abaxially with a continuous stripe of short (ca. 0.1 mm) dense hairs, otherwise completely glabrous; leaf tissue glabrous; sori oblong to reniform, ca. 3–5 on acroscopic margin of segment; $2n = 90$ (cult.?).

Limestone ridges, canyons, and slopes bordering streams in Tropical Rain Forest, Seasonal Evergreen Forest; uncommon in Northern and Eastern highlands; 300–1200 m. Southern Mex. (S.L.P., Ver., Oax., Tab.), Bel., Hond. Chiapas Collections: *G 419,* pt. (YU); *G 448* (K, NY); *28876*; *33852*; *34885*; *42827*.

This species is superficially similar to *A. polyphyllum* Willd. (from Trin., Ven., and Col.), but that species has the axes glabrous abaxially, and the color of the stalks stops abruptly at the base of segments.

Species to be Looked for in Chiapas

Adiantum galeottianum Hook. —Gro., Oax. (type: Oaxaca, *Galeotti 6561,* K!). Blade simply pinnate or with lowermost pinnae bipinnate, with about two pairs of pinnules; ultimate segments orbicular to subcordate; indusia reniform to suborbicular.

Adiantum shepherdii Hook. —Gro., Méx., Mich. (type: *Bates s.n.,* 1834, K!). Blade linear, simply pinnate, with rhomboid imbricate segments, occasionally with lowermost pair of pinnae pinnate.

Uncertain Species

Adiantum amplum Presl. —Rel. Haenk. 1:63. 1825 (type: "Habitat in Mexico et in Guayaquil [Ecuador]." From the description, it is impossible to place this name; no one recently has seen the type. Morton (1955) placed the name with a query under *A. princeps*. *Adiantum amplum* might also be *A. andicola*, *A. braunii*, or even *A. patens*. The only one of these four species that occurs with certainty in both Ecuador and Mexico is *A. patens*. If *A. amplum* proves to be any one of the other three, it has priority.

4. ALSOPHILA

Alsophila R. Brown, Prodr. Fl. Nov. Holl. 158. 1810. —Type: *Alsophila australis* R. Brown.
For additional synonymy, see Tryon (1970).

Plants usually arborescent; stipe scaly at base, smooth to tuberculate, or with corticinate spines, lacking trichomes; stipe scales (especially on abaxial side) ± appressed, structurally marginate, with a narrow to broad margin of cells different in orientation, size, shape, and usually in color from those of central portion, some or all scales bearing a dark (rarely lighter colored) seta at apex and often one seta or more on edge or body of scale; minute indument of stipe, when present, of trichomidia and (or) squamulae; costae usually pubescent above, rarely glabrous; veins free, basal veins of adjacent segments extending above sinus; indusia absent, or present and scalelike to sphaeropteroid; spores usually 16 per sporangium (64 in a few species), globose-tetrahedral, typically with a ridged perine; $x = 69$.

Pantropical, with about 230 species (Tryon, 1970). According to Tryon, the genus is poorly represented in America, with about 12 species, but well represented in Africa-Madagascar (ca. 60

spp.), and India and Sri Lanka (Ceylon) to southern Japan and the Pacific (ca. 160 spp.). The sole Mexican species, *A. salvinii,* is apparently related to certain paleotropical species (Gastony and Tryon, 1976).

References: Tryon, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53; Gastony, G. J., and R. M. Tryon. 1976. Spore morphology in the Cyatheaceae. II. The genera *Lophosoria, Metaxya, Sphaeropteris, Alsophila,* and *Nephelea.* Amer. J. Bot. 63:738–758.

1. **Alsophila salvinii** Hook., Syn. Fil. 36. 1866.

—Type: Guatemala, Chilasco, *Salvin & Godman s.n.* [“4β”] (K—2 sheets!).

Alsophila munchii Christ, Bull. Herb. Boissier (2)5:734. 1905. —Type: Mexico, Chiapas, San Pablo, *Münch 139* (presumably P; isotype DS!).

Illustrations: Hemsley, Biol. Centr.-Amer. 5:pl. 104. 1885; Stolze, Fieldiana, Bot. 39:104. 1976.

Trunk mostly 3–6 m tall; fronds 2.5–3.5 m long; stipe base scales lanceolate, brownish to atropurpureous with light margins; stipe atropurpureous to blackish, without spines, but rough to the touch, with up to 5 pairs of aphlebiae (small skeletal pinnae) at the base; blade tripinnate-pinnatifid; rachis atropurpureous to blackish, shining; scales of costae and costules ovate, dark with light margins, bearing dark setae along margins and at apex; leaf tissue glabrous, dark green above, lighter green below; sori without indusia; spores 64 per sporangium.

In Montane Rain Forest; uncommon and widely scattered in Northern Highlands (Jitotol Ridge), n Central Plateau, Sierra Madre; 1900–2100 m. Southern Mex. (Oax.), Guat., Hond., Salv., Nic. Chiapas Collections: *GM139* (DS); *T&L 41444* (DS); *Ti 636-4* (DS); *C 321* (DS); *P 6769* (UC); *EM s.n.* (MEXU); *EM 38280* (MEXU); *20015*; *21465*; *23236*; *25380*; *34394*.

5. ANANTHACORUS

Ananthacorus Underw. & Maxon, Contr. U.S. Natl. Herb. 10:487. 1908. —Type: *Ananthacorus angustifolius* (Swartz) Underw. & Maxon [≡*Pteris angustifolia* Swartz].

Plants epiphytic; rhizome 5–10 cm long, densely scaly, with clathrate, iridescent scales, bearing masses of brown-tomentose roots; fronds pendent, with simple blades, exstipitate, blade entire, linear, glabrous; veins concealed, anastomosing, forming areoles in 2–4 series on both sides of midrib, without included veinlets; sporangia borne in a continuous or sometimes interrupted sunken line along each of submarginal commissural veins; indusia absent; paraphyses present; spores reniform, monolete, smooth, hyaline; $x = 120$.

Monotypic, the single species extending from southern Mexico and the Antilles to Bolivia and Brazil. *Ananthacorus* is closely related to *Vittaria* and *Antrophyum.*

1. **Ananthacorus angustifolius** (Swartz) Underw. & Maxon, Contr. U.S. Natl. Herb. 10:487. 1908.

—*Pteris angustifolia* Swartz, Prodr. Veg. Ind. Occ. 129. 1788. —*Taenitis angustifolia* (Swartz) Spreng., Syst. Veg. 4:42. 1827. —Type: “Jamaica and Hispaniola” (cf. Swartz, Fl. Ind. Occ. 3:1599. 1806), probably collected from Jamaica by *Swartz* (fide Proctor, Fl. L. Antill. 2:376. 1977).

Illustrations: **Fig. 2**; Tryon, Contr. Gray Herb. 194:218. 1964; Bauer *in* Hooker & Bauer, Gen. Fil. pl. 77A. 1842 [as *Pteropsis angustifolia*]; Proctor, Fl. L. Antill. 2:375, 1977.

Rhizome short- to long-creeping, ca. 2–3 mm diam., fronds clustered to usually distant; rhizome scales brownish, narrowly linear-lanceolate to lanceolate, attenuate, denticulate; fronds ca. 8–35 (55) cm long, (6) 10–14 (18) mm wide, tapering gradually to base and apex (sterile ones shorter and relatively broad, often elliptical), straight to subfalcate, nearly or quite sessile, stipe when present stramineous, not blackened; leaf tissue spongiose-subcoriaceous; sporangial lines ca. 1 mm broad, often extending nearly to blade tip, enveloped by numerous clavate-capitate, reddish-brown paraphyses; $n = 120$, $2n = 240$ (Jam.).

Epiphytic in Tropical Rain Forest, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; widely scattered but uncommon in Eastern and Northern highlands (not Jitotol Ridge), Sierra Madre; 300–1500 m. Southern Mex. (Gro., Oax., Ver.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., Braz.); Antill., Trin. Chiapas Collections: *S 1722* (MEXU, US); *21917*; *24004*; *26595*; *28877*; *33156*.

6. ANEMIA

Anemia Swartz, Syn. Fil. 6, 155. 1806 (nom. cons.). —Lectotype (first chosen by Underwood, Mem. Torrey Bot. Club 6:267, 276. 1899?): *Anemia phyllitidis* (L.) Swartz [≡*Osmunda phyllitidis* L.]. See Webbia 12:19–21, 1956, for discussion of typification.

For additional synonymy, see Mickel (1962:388).

Plants terrestrial or epipetric; rhizome commonly creeping to suberect in a few species, densely bearing pluricellular hairs; fronds commonly partially (wholly in a few species) dimorphic, with lowermost pair of pinnae highly modified into long-stalked, erect (rarely horizontal), fertile panicles; stipe sulcate, not articulate; blade commonly 1–3 pinnate; veins dichotomous, commonly free, anastomosing (but without included veinlets) in a few species; sporangia in two rows on ultimate segments of fertile pinnae, sessile, subglobose to oval, fertile pinnae with reduced laminar tissue or seemingly without laminar tissue; spores tetrahedral to globose, trilete-scarred, striate; gametophytes inequilaterally cordate with a lateral meristem; $x = 38$.

About 85 species, most of them in the New World tropics and subtropics (Tex. and Fla. to Arg. and Urug.), but a few in Africa (7), Madagascar (3), and southern India (1). Mickel (1962) recognized three subgenera in *Anemia,* and two of these occur in Chiapas; the third is to be expected. Of the Chiapas species, *A. speciosa* and *A. adiantifolia* belong to subg. *Anemiorrhiza*; the rest are referable to subg. *Anemia.* The greatest number of species in the New World is found in drier regions of Brazil. There are secondary centers of diversity in western Mexico and Cuba. Most of the species occurring in Chiapas are wide-ranging.

Anemia is characteristically a genus of open or partially shaded, dry, rocky slopes; several species seem confined to limestone outcrops, especially those in subg. *Anemiorrhiza.*

REFERENCE: MICKEL, J. T. 1962. A monographic study of the fern genus *Anemia,* subg. *Coptophyllum.* Iowa State Coll. J. Sci. 36:349–482. 1962.

a. Fertile pinnae borne below the base of sterile blade; rhizome hairs dark brown; multicellular laminar hairs nonglandular.
  b. Blade pinnate, the pinnae subentire to serrulate; sterile pinnae 0–4 lateral pairs; rhizome short-creeping .... 7. *A. speciosa*
  bb. Blade bipinnate or more compound; sterile pinnae 8 or more pairs; rhizome usually long-creeping .... 1. *A. adiantifolia*
aa. Fertile pinnae borne at base of sterile blade; rhizome hairs often orangish; multicellular laminar hairs glandular.
  c. Veins reticulate; panicle of fertile pinnae as long as fertile stalk or longer .... 6. *A. phyllitidis*
  cc. Veins free, or casually anastomosing in one species (*A. munchii*); panicle of fertile pinnae shorter than fertile stalk.
    d. Pinnae mostly deeply incised, the segments commonly narrow and cuneate .... 2. *A. hirsuta*
    dd. Pinnae serrulate to crenulate, or with a few deep lobes on lower pinnae.
      e. Stipes short (mostly 1–6 cm), especially on the sterile fronds; pinnae broadly rounded at tip; sterile blade terminating in a broadly obovate to flabelliform apical segment; fronds more or less in a rosette .... 4. *A. oblongifolia*
      ee. Stipe mostly longer than 6 cm; pinnae acutish at tip; sterile blade terminating in an ovate, lanceolate, or pinnatifid apical segment; plants not rosette-forming.
        f. Lower pinnae crenately incised or lobed .... 5. *A. pastinacaria*
        ff. Lower pinnae not incised or lobed.
          g. Veins entirely free; pinnae without a distinct midrib; stalk of fertile pinnae not usually exceeding length of sterile blade .... *A. hirta*
          gg. Veins basically free but with a few casually anastomosing; pinnae with a ± distinct midrib; stalk of fertile pinnae usually exceeding length of sterile blade .... 3. *A. munchii*

1. Anemia adiantifolia (L.) Swartz, Syn. Fil. 157. 1806.

—*Osmunda adiantifolia* L., Sp. Pl. 2:1065. 1753. —LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:53. 1977): Plumier's Tract. Fil. Amer. pl. 158, 1705, illustrating a plant collected near Petit Goave, Haiti.

Anemia carvifolia Presl, Rel. Haenk. 74. 1825. —TYPE: Mexico, collector not stated, *Haenke*? (presumably PR or PRC).

ILLUSTRATIONS: Hooker & Greville, Icon. Fil. 1:pl. 16. 1827; Small, Ferns SE States 334. 1938; Proctor, Fl. L. Antill. 2:52. 1977.

Rhizome long-creeping, ca. 3–4 mm diam., densely clothed with dark brown septate or moniliform trichomes 2–4 mm long; fronds to 80 cm long (including erect, fertile pinnae) and 25 cm broad, partly dimorphous, fertile pinnae borne 0.5–2.5 cm below sterile portion of blade; stipe to 45 cm long, stramineous or darkened toward base, or brownish throughout, glabrescent; sterile portion of blade ovate-deltoid, bipinnate to often tripinnate or tripinnate-pinnatifid at base; sterile pinnae anadromous, ascending, all but upper ones stalked, basal ones to 15 cm long, 10 cm broad, basiscopic pinnules longer than acroscopic ones; pinnules with ultimate segments commonly obovate to linear-obovate, cuneate at base, rounded to subtruncate at apex, margins erose-denticulate to subentire; veins free, raised; leaf tissue subcoriaceous, lustrous, with scattered, pale septate trichomes on veins below, more numerous trichomes on axes (both sides), larger trichomes often with a dark brown tip; fertile pinnae to 35 cm long, the panicle tripinnate; $n = 38$, 76, and sterile triploids (Jam.); $n = 38$ (S.L.P.).

Often calcicolous, slopes and ravines in Pine-Oak-Liquidambar Forest, Tropical and Montane rain forests, Seasonal Evergreen Forest, Tropical Deciduous Forest; common at lower elevations in Central Plateau, Central Depression, Northern Highlands (not Jitotol Ridge); 300–1600 m. Mexico (N.L., Tam., S.L.P., Hgo., Ver., Tab., Yuc., Mich., Gro., Oax.), Bel., Guat., Hond., C.R.; Fla., Bah. I., Antill., Trin. CHIAPAS COLLECTIONS: *La 222* (DS); *GM 193* (DS, US); *MC 2168* (US); *Me 2020* (US); *G 240* (K); *G 444* (PH); *14975*; *21859*; *21863*; *21930*; *23588*; *27095*; *32572*; *32772*; *35351*; *37219*; *41535*.

2. Anemia hirsuta (L.) Swartz, Syn. Fil. 155. 1806.

—*Osmunda hirsuta* L., Sp. Pl. 2:1064. 1753. —TYPE: uncertain; based in part on Plumier's Tract. Fil. Amer. pl.

162, 1705, illustrating a plant from Hispaniola. Sloane and Petiver illustrations also cited. LINN 1244.5 is not this species, but *Anemia adiantifolia* (L.) Swartz, and was obtained by Linnaeus after 1767 (Jackson, 1912).

Anemia hirsuta var. *achilleaefolia* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):20. 1842. —Type: Mexico, Oaxaca, "environs de Zacatepèque et de Juquila," *Galeotti 6363* (BR! isotype BR!).

Illustrations: Stolze, Fieldiana, Bot. 39:29, fig. 7d. 1976; Matuda, Anales Inst. Biol. Univ. Nac. México 27:62. 1956; Vareschi, Fl. Venez. 1(1):pl. 33. 1969.

Rhizome short-creeping, densely clothed with orangish filiform trichomes; fronds to 40 cm long (including erect, fertile pinnae) and 6 cm broad, caespitose, partly dimorphous, fertile pinnae and lowermost sterile pinnae arising from same position; stipe to 20 cm long, commonly exceeding the sterile blade, stramineous but darkened at base, glabrate; sterile portion of blade oblong-lanceolate, gradually tapering to a pinnatifid apex, pinnate-pinnatifid to barely bipinnate; sterile pinnae ± sessile to very short-stalked, to 3 cm long and ca. 1.5 cm broad, inequilateral, obliquely and deeply incised into linear or narrowly cuneate segments, these irregularly toothed, a distinct midrib lacking; veins free, ± obscure beneath; leaf tissue firm-herbaceous, dull or somewhat lustrous above, villous beneath, glabrous above; fertile pinnae to ca. 20 cm long, panicle spikelike, much shorter than stalk, scarcely or not at all foliaceous; *n* = 76 (Cma., Gro., Jam., Peru).

Pine-Oak slopes; uncommon in Central Plateau, Central Depression, Sierra Madre; 850–2150 m. Southern Mex. (Cma., Jal., Méx., Mlos., Ver., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., Braz.); Gr. Antill., Trin. Chiapas Collections: *GM 31* (DS), "Palenque," probably in error; *R&R&M 350* (US); *EM 4802, 4892, 4751, 1767* (all MEXU, not seen); *P 6859*, pt. (US); *11861*; *26938*; *27028*; *40054*; *42426*.

Mickel (in Stolze, Fieldiana, Bot. 39:32. 1976) reported that *A. hirsuta* hybridizes with *A. pastinacaria*, *A. tomentosa*, *A. karwinskyana*, and *A. phyllitidis* in Mexico. Hybrids have not yet been discovered in Chiapas, and if they do indeed occur there, they are probably very uncommon. Species of *Anemia* are only infrequently found growing together in Chiapas, in contrast to the situation further north in Mexico, where several species often grow together.

3. **Anemia munchii** Christ, Bull. Herb. Boissier (2)7:792. 1907.

—Type: Mexico, Chiapas, San Cristóbal, *Münch 30* (P! isotype DS!).

Illustration: none found.

Similar to *A. pastinacaria*, differing by the ± entire pinnae with serrulate margins; veins mostly free, but a few casually anastomosing.

In Seasonal Evergreen Forest; rare in Northern Highlands, Central Plateau; 900 m. Known with certainty only from Oax. and Chis. Chiapas Collections: *GM 30* (DS, P), type; *G 320* (YU); *21932*.

The status of this species is uncertain. It is possibly a hybrid between *A. phyllitidis* and *A. pastinacaria* or *A. oblongifolia*. Additional study is needed.

4. **Anemia oblongifolia** (Cav.) Swartz, Syn. Fil. 156. 1806.

—*Osmunda oblongifolia* Cav., Icon. Descr. Pl. 6:69, pl. 592, fig. 2. 1801. —Type: Panama, Née (MA, seen and commented upon by Christensen, Dansk. Bot. Ark. 9(3):31. 1937).

Anemia pilosa Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):19, pl. 2, fig. 1. 1842. —Type: Mexico, Oaxaca, Zacatepèque, *Galeotti 6353* (BR! isotype BR!).

Illustrations: see original; also Stolze, Fieldiana, Bot. 39:29, fig. 7e. 1976; Vareschi, Fl. Venez. 1(1):pl. 34 [as *A. humilis* (Cav.) Swartz].

Rhizome oblique to ascending, clothed with orangish, filiform trichomes; fronds to 30 cm long (including the erect, fertile pinnae), 3.5 cm broad, caespitose, partly dimorphous, fertile pinnae and lowermost sterile ones arising from same position; stipe 1–6 (8) cm long, 1–2 mm diam., usually shorter (often much shorter) than sterile blades, stramineous, sparsely villous to glabrate; sterile portion of blade obovate-oblong, terminating in a broadly obovate to flabelliform apical segment, 1-pinnate; sterile pinnae 2–9 pairs, contiguous or subimbricate, sessile, to 2.0 cm long and 0.7 cm broad, oblong, broadly rounded at apex, strongly inequilateral at base, truncate or rounded above and cuneate below, serrulate to crenulate, a distinct midrib lacking; veins free; leaf tissue subcoriaceous, slightly lustrous, persistently pilose on both sides; fertile pinnae to 18 cm long, panicle much shorter than the stramineous stalk; *n* = 114 (Gro.).

Rocky slopes and canyons with Seasonal Evergreen Forest; uncommon in Central Depression and where it adjoins Northern Highlands; 850–900 m. Mexico (Gro., Méx., Oax.), Guat., Hond., Nic., Pan.; S.A. (Ven. and Col. to Bol., Braz.). Chiapas Collections: *21969*; *27100*; *37786*.

5. **Anemia pastinacaria** Moritz *in* Prantl, Unters. Morph. Gefäss. II. Schiz. 110. 1881.

—Type: uncertain; original publication not seen.

Anemia pilosa Mart. & Gal. *β. longistipes* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1: 301. 1849. —*Anemia longistipes* (Liebm.) C. Chr., Ind. Fil. 53. 1905. —Type: Mexico, Oaxaca, between Trapiche de la Concepción and Tepitongo, *Liebmann* (presumably C).

Illustrations: Stolze, Fieldiana, Bot. 39:29, fig. 7c. 1976; Vareschi, Fl. Venez. 1(1):pl. 32. 1969.

Similar to *A. hirsuta*, but differing by the pinnae merely crenulate or denticulate, or with a few deep lobes on some of the lower pinnae.

Along streams and rocky slopes in Montane Rain Forest; uncommon in Central Plateau, Sierra Madre, Pacific Coastal Plain, Northern Highlands ?; 300–1000 m. Mexico (Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. to Braz. and Bol.); Trin. Chiapas Collections: *P 6859*, pt. (UC, US); *EM 17901* (DS, MEXU, US); *X&S X-280* (US); *C&D 188* (US); *11861*; *22268*.

Mickel (in Stolze, Fieldiana, Bot. 39:32. 1976) reported that this species hybridizes with *A. hirsuta* in Oaxaca.

6. **Anemia phyllitidis** (L.) Swartz, Syn. Fil. 155. 1806.

—*Osmunda phyllitidis* L., Sp. Pl. 2:1064. 1753. —Type: based in part on Plumier's Tract. Fil. Amer. pl. 156, 1705, illustrating a plant from Hispaniola.

Anemia cordifolia Presl, Rel. Haenk. 1:73, pl. 11, fig. 3. 1825. —Syntypes: "Mexico et in vallivus Cordillerarum Peruviae," collector not stated, *Haenke*? (presumably PR or PRC).

Illustrations: Langsdorff & Fischer, Icon. Fil. pl. 28. 1810; Matuda, Anales Inst. Biol. Univ. Nac. México 27:61. 1956; Vareschi, Fl. Venez. 1(1):pl. 33. 1969.

Rhizome short-creeping to commonly obliquely ascending, densely clothed with filiform, orange to brownish septate trichomes to 7 mm long; fronds to 75 (90) cm long (including erect fertile pinnae), 20 (30) cm broad, caespitose, partly dimorphous, fertile pinnae and lowermost sterile ones arising from same position; stipe to 50 (70) cm long, frequently exceeding the sterile leaf, stramineous but darkened at base, rather densely and subpersistently villous; sterile portion of blade ovate, 1-pinnate with a ± conform terminal pinna; sterile pinnae (2) 4–6 (7) lateral pairs, sessile to short-stalked (to 5 mm), to 14 cm long, 3 (4) cm broad, ovate to lanceolate, acute at tip, rounded or truncate at base, margins crenulate, with a distinct midrib; veins anastomosing; leaf tissue chartaceous, dull to slightly lustrous, pilose on costae below but often glabrescent; fertile pinnae to 40 cm long, panicle about as long as the fertile stalk, frequently exceeding the sterile blade; $n = 76$ (Chis., C.R.).

Wooded slopes and along streams, in Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; common in Northern and Eastern highlands, Central Plateau, Sierra Madre; 350–1700 m. Mexico (Mich., S.L.P., Ver., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. and Ven. to s Braz., Bol., and n Arg.); Gr. Antill., Trin. Chiapas Collections: *R 1075* (PH); *EM 2053, 4030, 4803* (MEXU); *H&S 20179* (US); *Lm 3862* (PH); *C&D 168* (US); *GM 29* (DS); *La 2563* (DS); *T&L 41729* (DS); *7720*; *7777*; *12019*; *14903*; *21723*; *21792*; *21850*; *21931*; *22277*; *24076*; *27130*; *27475*; *28147*; *32484*; *32748*; *33155*; *37669*; *38297*; *38431*; *38581*; *39062*; *40063*.

This is by far the most common species of *Anemia* in Chiapas, differing from all others in the state by the copiously anastomosing veins.

7. **Anemia speciosa** Presl, Suppl. Tent. Pterid. 89. "1845" [1846].

—*Anemia mexicana* Klotzsch var. *paucifolia* Hook., Second Cent. Ferns pl. 65. 1861. —Type: western Mexico, *Née* (presumably PR or PRC).

Illustrations: **Fig. 5**; see also under synonym cited and Stolze, Fieldiana, Bot. 39:29, fig. 7b. 1976.

Rhizome short-creeping, densely clothed with dark brown septate trichomes; fronds to 50 cm long (including the ascending fertile pinnae), 15 cm broad, partly dimorphous, fertile pinnae borne 0.6–3.0 cm below sterile portion of blade; stipe to 30 cm long, stramineous to light brown, darkened at base, glabrate; sterile portion of blade ovate-deltoid, 1-pinnate; sterile pinnae (0) 1–4 lateral pairs, stalked to ca. 5 mm, to 10 cm long, 3.5 cm broad (apical pinna somewhat larger), ovate to ovate-lanceolate, acute at tip, rounded to subcordate at base, margin subentire to serrulate, with a distinct midrib; veins free; leaf tissue coriaceous to subcoriaceous, dull or somewhat lustrous above, glabrate beneath; fertile pinnae to 12 cm long, usually not exceeding blade, panicle as long as or longer than stalk.

On rocks and cliff faces (especially limestone bluffs) in Seasonal Evergreen Forest, Tropical and Montane rain forests; uncommon in Eastern Highlands, edge of Central Depression; 200–1350 m. Southern Mex. (Chis. only), Bel., Guat. Chiapas Collections: *Dr 1623* (MEXU, US); *H&S 20048* (US); *S 1715* (US); *21564*; *27159*; *32950*; *33946*.

Species to be Looked for in Chiapas

Anemia bartlettii Mickel —known only from Bel. Differs from other Chiapas species by the combination of sterile blade bipinnate; fertile pinnae borne below base of sterile blade; rhizome with reddish-brown trichomes; sterile pinnae 11–16 pairs.

Anemia cicutaria Kunze ex Spreng. —Mex. (Q. Roo.), Guat., Bah. Is., Cuba. Distinguished from all other Chiapas species by the fronds completely dimorphous; blade small, to 15 cm long, 5 cm broad, bipinnate to bipinnate-pinnatifid.

Anemia guatemalensis Maxon —Guat., Hond., Salv. Differs from other Chiapas species by the combination of sterile blade bipinnate-pinnatifid to tripinnate; fertile pinnae borne below base of sterile blade; rhizome with orange trichomes; sterile pinnae 8–15 pairs; segments ovate to elongate-ovate.

Anemia hirta (L.) Swartz —Bel., Guat., Hond., Braz., Antill. Differs from other Chiapas species by the combination of sterile blade 1-pinnate, not incised; fertile pinnae borne at base of sterile blade; veins free; stalk of fertile pinnae not usually exceeding length of sterile blade.

Anemia karwinskyana (Presl) Prantl —Jal., Mich., Méx., Gro., Oax. Differs from other Chiapas species by the combination of sterile blade bipinnate to bipinnate-pinnatifid; fertile pinnae borne below the sterile pinnae; rhizome hairs orangish; sterile pinnae 8–12 pairs; segments ovate-obtuse.

Anemia tomentosa (Sav.) Swartz var. *mexicana* (Presl) Mickel —Son., Chih., Dgo., Sin., Jal., Tam., S.L.P., Nay., Oax., Pue., Ver.; S.A. (Ven., Col.); Hisp. Differs from other Chiapas species by the combination of sterile blade bipinnate-pinnatifid; fertile pinnae borne below base of sterile blade; rhizome compact to short-creeping, with orange trichomes; sterile pinnae 6–13 pairs; most pinnae anadromous. Other varieties occur in South America, south to Argentina.

7. ANETIUM

Anetium Splitg., Tijdschr. Natuurl. Gesch. Physiol. 7:395. 1840. —*Pteridanetium* Copel., Gen. Fil. 224. 1947, based on *Anetium* Splitg., not *Anetia* Endl. (1839); a superfluous new name according to Morton (Amer. Fern J. 43:71. 1953) —Type. *Anetium citrifolium* (L.) Splitg. [≡*Acrostichum citrifolium* L.].

Plants epiphytic; rhizome slender, long-creeping, siphonostelic, densely scaly; scales clathrate, iridescent; fronds remote, simple, entire (edges of larger fronds repand), glabrous; veins anastomosing, forming many series of areoles on both sides of costa; sporangia borne on the veins and also between veins in small clusters or larger, irregular patches; indusia and paraphyses absent; spores globose-tetrahedral, smooth, hyaline; $x = 30$.

Monotypic, tropical America. Closely related to *Antrophyum*, and especially to *Polytaenium*.

1. **Anetium citrifolium** (L.) Splitg., Tijdschr. Natuurl. Gesch. Physiol. 7:395. 1840.

—*Acrostichum citrifolium* L., Sp. Pl. 2:1067. 1753. —*Hemionitis citrifolia* (L.) Hook., Sp. Fil. 5:193. 1864. —*Pteridanetium citrifolium* (L.) Copel., Gen. Fil. 224. 1947. —Type: Plumier's Tract. Fil. Amer. pl. 116, illustrating a plant from Martinique.

Illustrations: Tryon, Contr. Gray Herb. 194:228. 1964;

Rovirosa, Pterid. Sur Mex. pl. 55. 1909; Diels, Pflanzenfam. 1(4):301. 1899; Proctor, Fl. L. Antill. 2:370. 1977.

Rhizome mostly 1.5–4 mm diam.; rhizome scales brownish, mostly broadly ovate-attenuate; fronds pendent, (7) 15–30 (100) cm long, 1.5–8 (15) cm broad, the blade elliptical to oblanceolate, decurrent at base, sessile to short-stiped in larger fronds; blade apex obtuse to acute to abruptly acuminate; costae extending about three-fourths length of blade; leaf tissue herbaceous-fleshy (papyraceous upon drying); $n = 60$ (Trin.).

Epiphytic in Tropical Rain Forest; rare in Eastern and Northern highlands; 300 m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Bol. and Fr. Gui., Braz.); Antill., Trin. Chiapas Collections: *Ma 1093* (not seen, cited by Rovirosa, Pterid. Sur Mex. 248, 1909, from Moyos, 16 Oct. 1894); *33940*.

8. ANOGRAMMA

Anogramma Link, Fil. Sp. 137. 1841. —Lectotype (first chosen by ?): *Polypodium leptophyllum* L. [≡*Anogramma leptophylla* (L.) Link].

Plants terrestrial or on rocks; rhizome very small, erect, with a few thin scales; fronds fasciculate, usually small; blade 2–4-pinnate; veins free, forked; leaf tissue glabrous, without wax below; sporangia borne along the veins back of the unmodified margin, often confluent over the segment at maturity; indusia and paraphyses absent; spores globose-tetrahedral; gametophytes perennial (all species ?), producing annual, short-lived sporophytes, sometimes from a perennating bulblet; $x = 29$.

About six species, four in the New World tropics and subtropics; one species is endemic to Ascension and another is known only from Africa. *Anogramma leptophylla,* the type, is subcosmopolitan. *Anogramma* is very closely related to *Pityrogramma.*

Reference: Tryon, R. 1962. Taxonomic fern notes. II. *Pityrogramma* (including *Trismeria*) and *Anogramma*. Contr. Gray Herb. 189:52–76.

Ultimate lobes obtuse, obovate-cuneate to flabellate; blade deltoid to ovate, sometimes subdimorphic ..... 2. *A. leptophylla*
Ultimate lobes acute, ovate to ovate-lanceolate; blade deltoid, monomorphic .... 1. *A. chaerophylla*

1. **Anogramma chaerophylla** (Desv.) Link, Fil. Sp. 138. 1841.

—*Gymnogramma chaerophylla* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:305. 1811. —Type: "habitat in america australia (paragay)" [specimen], Herb. Desvaux. (P!).

Illustrations: **Fig. 6**; Tryon, Contr. Gray Herb. 194:78, fig. 47. 1964; Hooker & Greville, Icon. Fil. 1:pl. 45. 1827.

Fronds 10–40 cm long, monomorphic; stipe stramineous from a reddish-brown base; blade broadly deltoid, 3-pinnate or more; ultimate segments acute or acutish at tip, ovate; leaf tissue thin, herbaceous; $n = 29$ (Jam.), 58 (Braz.).

On rocks in Montane Rain Forest; rare in s Sierra Madre; 2100 m. South America (Braz., Parag., Urug., N Arg.); Gr. Antill. Chiapas Collections: *22842*; *40251*; *41712*.

The Chiapas collections (all from the same locality) apparently represent the sole records from Mexico and Central America. *Anogramma chaerophylla* was found growing with *A. leptophylla* at this locality.

2. **Anogramma leptophylla** (L.) Link, Fil. Sp. 137. 1841.

—*Polypodium leptophyllum* L., Sp. Pl. 1092. 1753. —*Gymnogramma leptophylla* (L.) Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:305. 1811. —Lectotype (following Morton, Amer. Fern J. 60:101–103. 1970): LINN 1251.56.

Pityrogramma guatemalensis Domin, Spisy Přír. Fak. Karlovy Univ. 88:9. 1928. —*Anogramma guatemalensis* (Domin) C. Chr., Ind. Fil. Suppl. III, 26. 1934. —Type: Guatemala, "Fuego," *Salvin & Godman 172* (K!, photo UC!).

Gymnogramma leptophylla (L.) Desv. var. *mexicana* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):27. 1842 (nom. nud.).

Illustrations: Tryon, Contr. Gray Herb. 194:78, fig. 46. 1964; Hooker & Greville, Icon. Fil. 1:pl. 25. 1827; Fée, Gen. Fil. pl. 19, A, fig. 1. 1852; Knobloch & Correll, Ferns Chih. p. 101. 1962.

Fronds 2–20 (30) cm long, subdimorphic (ours), the longest fronds with narrower ultimate segments but both types of fronds fertile; stipe stramineous to reddish brown, especially at base, shining; blade ovate to deltoid, 2–4-pinnate; ultimate segments obtuse at tip, narrowly obovate-cuneate to flabellate and often bifid at apex; leaf tissue thin, herbaceous; $n = 29$ (Oax., N.Z.), ca. 58 (India), 27? (Nay.).

On wet rocks and road banks in Evergreen Cloud Forest, Pine-Oak-Arbutus Forest, infrequently Montane Rain Forest; uncommon on higher peaks of Central Plateau, s Sierra Madre; 1900–3000 m. Mexico (Chih., Nay., Jal., Méx., Ver., Oax.), Guat., Nic.; S.A. (Peru, s Braz.); Eur., Afr., Asia, N.Z. Chiapas Collections: *GM s.n.* (DS, US); *G 301* (K); *X&S X-419* (US); *22101*; *22687*; *22714*; *22937*; *32025*; *39519*; *39520*; *40252*; *41623*.

Anogramma guatemalensis was mentioned as "questionably distinct from *A. leptophylla* at the species level" by Gastony and Baroutsis (Amer. Fern J. 65:71. 1975), and I agree. Both the usual type of frond with flabellate segments and the very long, finely dissected fronds of *A. guatemalensis* can be found on the same rhizome (e.g., *22687*).

9. ANTROPHYUM

Antrophyum Kaulf., Enum. Fil. 197. 1824. —Lectotype (first chosen by J. Smith?, Hist. Fil. 154. 1875): *Antrophyum plantagineum* (Cav.) Kaulf. [≡*Hemionitis plantaginea* Cav.]; Benedict (1907) and Tryon (1964) regarded *Antrophyum reticulatum* (Forst.) Kaulf. as type.

Polytaenium Desv., Mém. Soc. Linn. Paris 6:218. 1827. —TYPE: *Polytaenium lanceolatum* (Swartz) Desv. [≡*Antrophyum lineatum* (Swartz) Kaulf.].

Scoliosorus Moore, Ind. Fil. xxix. 1857. —TYPE: *Scoliosorus ensiformis* (Hook.) Moore [≡*Antrophyum ensiforme* Hook.].

Plants epiphytic; rhizome short-creeping, immersed in a dense mass of matted, hairy roots, with brownish to blackish, lanceolate, decidedly clathrate scales that are often comose at their base; fronds nonarticulate; blade simple, linear to elliptic to oblanceolate, ± entire or slightly repand, gradually decrescent below to a short, alate stipe; veins repeatedly dichotomizing and then anastomosing to form elongate areoles; leaf tissue glabrous on both sides; epidermis with spicular idioblasts; sporangia borne along veins, not in discrete sori, often forming a reticulate network, superficial or sunken; paraphyses present or absent; indusia absent; spores bilateral to tetrahedral, lacking perispore, smooth, yellowish hyaline to green; gametophytes elongate, never cordate; $x = 60$ (from $x = 30$?).

In a broad sense, as taken here, *Antrophyum* contains perhaps 35 species, ca. 10 in the Neotropics and 25 in the Paleotropics. Benedict (1911) and Tryon (1964) maintained *Polytaenium*, with ca. 10 New World species, as distinct from *Antrophyum* s.s. of the Old World. The difference between these two genera is that species of the latter genus lack a distinct midrib for all or most of the length of the blade and bear paraphyses among the sporangia. The existence of a single New World species, *A. ensiforme* (type of *Scoliosorus*), that bears capitate paraphyses confuses this distinction. Copeland (1947) accepted all three genera; Tryon (1964) recognized both *Antrophyum* and *Polytaenium*, placing *Scoliosorus* with *Antrophyum*. I find the distinction between *Antrophyum* and *Polytaenium* weak enough so that I believe it is preferable to recognize only a single genus *Antrophyum*. If it could be shown that *Polytaenium* and *Antrophyum* have different origins, as Copeland (1947:224) seemed to suggest, then a good case could be made for recognizing both genera. Such evidence is lacking at present.

Most of the Chiapas species of *Antrophyum* have rather wide distributions in the lowland tropics. Only *A. ensiforme* reaches higher elevations.

REFERENCES: BENEDICT, R. C. 1907. The genus *Antrophyum*—I. Synopsis of the subgenera, and the American species. Bull. Torrey Bot. Club 34:445–458; BENEDICT, R. C. 1911. The genera of the fern tribe *Vittarieae*: their external morphology, venation, and relationships. Bull. Torrey Bot. Club 38:153–190; TRYON, R. 1964. Taxonomic fern notes. IV. Some American vittarioid ferns. Rhodora 66:110–117.

a. Paraphyses present among the sporangia, pyriform; spores bilateral, monolete, yellowish; sporangia in lines not parallel to midrib .... 2. *A. ensiforme*
aa. Paraphyses absent; spores tetrahedral, trilete, greenish to light yellowish.
  b. Sporangia in long, simple grooves parallel to midrib .... 5. *A. lineatum*
  bb. Sporangia in short, angular or anastomosing grooves not or scarcely parallel to midrib.
    c. Blade oblanceolate; leaf tissue coriaceous, revolute at the margin; midrib greenish or darkened; areoles strongly divergent from midrib .... 1. *A. cajenense*
    cc. Blade narrowly to broadly elliptic; leaf tissue chartaceous to subcoriaceous; midrib stramineous.
      d. Blade narrowly elliptic, usually less than 1.5 (2.0) cm broad; axis of areoles ± parallel to midrib .... 4. *A. lanceolatum*
      dd. Blade broadly elliptic, usually greater than 2.0 cm broad; axis of areoles slightly to strongly divergent from midrib .... 3. *A. guayanense*

1. **Antrophyum cajenense** (Desv.) Spreng., Syst. Veg. 4:67. 1827, as "cayennense."

—*Hemionitis cajenensis* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:311. 1811. —*Polytaenium cajenense* (Desv.) Benedict, Bull. Torrey Bot. Club 38:169. 1911. —TYPE: "Gallia aequinoctiali" ["Cajenne" on specimen], Herb. Desvaux, collector not stated but possibly *Joseph Martin* (vide Tryon, 1964) (P! possible isotype B—Herb. Willd. 19560).

Antrophyum lacantunense Rov., Pterid. Sur Mex. 240, pl. 38A, figs. 10–11. 1909. —TYPE: Mexico, Chiapas, fluvium Lacanjá e tribu Lacandonorum, *Martínez s.n.* (herb. nost. num. 1097), not found.

ILLUSTRATIONS: **Fig. 7**; Tryon, Contr. Gray Herb. 194:223. 1964; Vareschi, Fl. Venez. 1(2):pl. 156. 1969.

Rhizome scales to ca. 4 mm long, 0.5 mm broad, long-attenuate; fronds arching, with alate stipes; blade oblanceolate, tapering very gradually below, rather abruptly distally, mostly 12–40 cm long, 2–4 cm broad; midrib greenish or darkened, prominently raised below; areoles diverging from midrib, narrowly rhomboid, with areolar veins sunken, easily visible; leaf tissue dark green, thick, usually coriaceous, the margin reflexed; sporangia along the areolar veins; paraphyses absent; spores tetrahedral, light yellowish to hyaline.

Epiphytic in Tropical Rain Forest; a single collection seen, Eastern Highlands near Guatemala border; 300 m. Southern Mex. (Oax.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Fr. Gui. to Col. south to Bol., Braz.); Gr. Antill., Trin. CHIAPAS COLLECTION: *34060*.

I have been unable to locate type material of *A. lacantunense*, but from the description and illustration, it is almost certainly *A. cajenense*.

2. **Antrophyum ensiforme** Hook. *in* Benth., Pl. Hartw. 73. 1841.

—*Scoliosorus ensiformis* (Hook.) Moore, Ind. Fil. xxix. 1857. —*Polytaenium ensiforme* (Hook.) Benedict, Bull.

Torrey Bot. Club 38:169. 1911. —Type: Mexico, "Cumbre de Totontepeque," *Hartweg* [*522*] (K!).

Antrophyum falcatum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):49, pl. 12. 1842 (not Blume, 1828). —*Antrophyum carnosum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:161. 1849. —*Antrophyum galeottii* Fée, Mém. Fam. Foug. 4:51, pl. 5, fig. 4. 1852. —Type: Mexico, Oaxaca, Llano-Verde, *Galeotti 6385* (BR! *6385bis* also at BR! photo BM!).

Illustrations: **Fig. 7**; see those cited under synonyms above.

Rhizome scales to 15 mm long, 1.5 mm broad, brownish; fronds flaccid, pendent, often curved; blade linear to narrowly oblanceolate, mostly (8) 15–40 (50) cm long, 1.0–2.0 (3.0) cm broad, acute at apex, tapering very gradually in lower half but without a distinct stipe, margins entire or nearly so; midrib stramineous, slightly raised below, distinct for about three-fourths length of blade; areolar veins immersed, superficially indistinct, with their long axis divergent from midrib, open along margin; leaf tissue thick, succulent; sporangia in simple to 1-forked, oblique lines on both sides of midrib, mixed with numerous, stalked, pyriform, reddish-brown paraphyses that arise singly or in clusters; spores bilateral, yellowish.

Epiphytic in Lower Montane and Montane rain forests, Evergreen Cloud Forest; widely scattered, but locally common in Northern and Eastern highlands, Sierra Madre, Central Plateau; 800–2800 m. Southern Mex. (Gro., Oax., Ver., Pue.), Guat., Hond., Salv., Nic., C.R., Pan. Chiapas Collections: *Dr 1625* (MEXU, NY, US); *G 218* (BM, K, NY, PH); *EM 214* (MEXU, US); *EM 2907* (K, MEXU, US); *GM 36* (DS pt., US); *15236*; *21670*; *24785*; *25016*; *25372*; *26284*; *28934*; *29723*; *29820*; *29880*; *30128*; *30859*; *31533*; *31759*; *31861*; *32268*; *32611*; *32941*; *33671*; *34815*; *35171*; *38783*; *38947*.

3. **Antrophyum guayanense** Hieron., Hedwigia 57:212. 1915.

—*Polytaenium guayanense* (Hieron.) Alston, Kew Bull. 1932:314. —Lectotype (chosen by Tryon, 1964:113): Trinidad, *Fendler 151* (B; isolectotypes NY, photo BM!; P! UC!).

Illustration: Tryon, Contr. Gray Herb. 194:223. 1964.

Similar to *A. lanceolatum* but differing in the broader elliptic blade (mostly 2–3 cm broad in middle) and areoles divergent from midrib; stipe stramineous, raised, conspicuous for at least ⅔ blade length; sori in slightly sunken grooves; paraphyses lacking; spores tetrahedral, green when fresh.

Epiphytic in Montane Rain Forest; se corner of Central Plateau; 1300 m. Southern Mex. (Chis. only); S.A. (Col. to Fr. Gui., Peru, Braz.); Trin. Chiapas Collections: *32212*; *35203*; *38946*.

The Chiapas specimens match very well the isolectotypes seen. However, there are several other names that must be taken into consideration before the Chiapas collections can be named with confidence. *Antrophyum jenmanii* Benedict (Bull. Torrey Bot. Club 34:454. 1907), type from Guyana (NY, photo BM!), is very poorly known, but apparently closely related. Tryon (1964) commented on this name and concluded that its application was uncertain. Lellinger has determined one of our collections (*35203*) as *A. jenmanii*. The type is a much larger specimen than any of the Chiapas collections.

Another closely related species may be *A. anetioides* Christ (Bull. Herb. Boissier, II. 5:12. 1905), type from Costa Rica.

Antrophyum guayanense differs from *A. cajenense* by the thinner blades, ± superficial or slightly sunken sporangia, stramineous midrib, and elliptic rather than oblanceolate blades.

4. **Antrophyum lanceolatum** (L.) Kaulf., Enum. Fil. 198. 1824.

—*Hemionitis lanceolata* L., Sp. Pl. 2:1077. 1753. —*Polytaenium lanceolatum* (L.) Benedict, Bull. Torrey Bot. Club 38:169. 1911. —Type: uncertain; LINN 1248.1 is this species but, according to Jackson (1912), was not in LINN prior to 1767. Linnaeus cited Petiver and Plumier (Tract. Fil. Amer. pl. 6. 1705) illustrations.

Antrophyum feei Schaffner ex Fée, Mém. Fam. Foug. 7:42, pl. 22, fig. 1. 1857. —Type: Mexico [Veracruz], "circa Huatusco," *Schaffner 133* (isotype K!).

?*Antrophyum stenophyllum* Rov., Pterid. Sur Mex. 242, pl. 7A, figs. 4–5. 1909. —Type: Mexico, Chiapas, "Cerro de Moyos, . . . et in sylvis valde umbrosis regionum fluvis Lacanjá conterminarum," *Martínez s.n.* (Herb. prop. num. 1104), not seen, not found at K, MEXU, PH, P.

Illustrations: see under *Antrophyum feei*, above; also Proctor, Fl. L. Antill. 2:372. 1977.

Rhizome scales to ca. 3 mm long, 0.4 mm broad; fronds pendent or arching, sessile; blade narrowly elliptic, gradually tapered ± equally on both sides of middle, mostly (4) 7–25 (55) cm long, (6) 8–20 mm broad; midrib stramineous, slightly raised below; areoles narrowly rhombic to hexagonal with their long axis parallel to midrib or slightly oblique toward frond apex, areolar veins easily visible; leaf tissue chartaceous; sporangia ± superficial along areolar veins; paraphyses absent; spores tetrahedral, yellowish to light greenish; $n =$ ca. 60 (P.R.).

Epiphytic in Tropical, Lower Montane and Montane rain forests; scattered in Northern and Eastern highlands, s Sierra Madre; 200–800 m. Southern Mex. (Ver.), Guat., Nic., C.R.; S.A. (Braz.); Antill., Trin. Chiapas Collections: *P 6718* (NY, UC, US); *P 6758* (UC, US); *GM 36* (DS, pt.); *GM s.n.* (BM, P); *EM 18389* (DS, MEXU, US); *22490*; *24212*; *28867*; *29848*; *31538*; *32951*; *35389*; *35425*; *38174*.

I have been unable to locate the type of *A. stenophyllum* Rov. From the description and illustration, it is probably *A. lanceolatum*. *Antrophyum feei* is merely a smaller form of *A. lanceolatum*; it occurs nearly throughout the range of the species.

5. **Antrophyum lineatum** (Swartz) Kaulf., Enum. Fil. 199. 1824.

—*Hemionitis lineata* Swartz, Prodr. Veg. Ind. Occ. 129. 1788. —*Polytaenium lineatum* (Swartz) J. Smith, J. Bot. (Hooker) 4:68. 1841. —Type: Jamaica, *Swartz s.n.* (presumably S; isotype Herb. Willd. 20033, B).

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 51. 1909; Tryon, Contr. Gray Herb. 194:223. 1964; Vareschi, Fl. Venez. 1(2):pl. 156. 1969.

Rhizome scales to ca. 4 mm long, 0.6 mm broad; fronds pendent or arching, often curved, nearly or quite without stipes; blade narrowly elliptic-linear, gradually tapered ± equally on both sides of middle, mostly 10–30 (43) cm long, 6–10 (15) mm broad; midrib stramineous to light green, slightly raised below; areoles long and narrow, parallel to midrib, with indistinct cross-veinlets; leaf tissue chartaceous to subcoriaceous; sporangia in (1) 2–4 long sunken grooves parallel to and on each side of midrib, the grooves bordered by raised wings perpendicular to plane of frond; paraphyses absent; spores tetrahedral, yellowish to hyaline; $n = 60$ (Jam.).

Epiphytic in Lower Montane and Montane rain forests, rarely seasonal Evergreen Forest; widely scattered localities in Northern and Eastern highlands, edge of Central Plateau; 800–1500 m. Southern Mex. (Ver.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., NW Arg., s Braz.); Antill. Chiapas Collections: *GM 175* (DS); *R 1050* (PH); *Dr 1619* (MEXU, US); *21645*; *22152*; *24962*; *31524*; *32204*; *32213*; *32544*; *33097*; *35231*; *37055*; *38950*.

10. ARACHNIODES

Arachniodes Blume, Enum. Pl. Jav. 241. 1828. —Type: *Arachniodes aspidioides* Blume.

Byrsopteris Morton, Amer. Fern J. 50:149. 1960. —Type: *Polypodium aristatum* Forster [≡*Arachniodes aristata* (Forster) Tindale].

Plants terrestrial; rhizome suberect to creeping, scaly; stipe erect, not articulate to rhizome, with 3 or more vascular bundles, scaly at base; main rachis not gemmiferous, ridges of upper surface never continuous with blade margin, groove glabrous or scaly; blade decompound, broadly deltoid or pentagonal, basiscopically produced in some species, anadromous, often with marginal teeth; costae grooved on adaxial surface, lacking hairs, the raised basiscopic edges of groove continuous with those of rachises; veins free, not reaching margin; glands usually absent on leaf tissue; indusia orbicular-reniform, attached by a deep sinus; paraphyses absent; spores bilateral, monolete, with a crested perispore; $x = 41$.

According to Tindale (1961), *Arachniodes* is a genus of about 50 species, mostly in the Sino-Himalayan region, with a few species in Africa and America. Morton (1960) recognized four American species, three of which are very local and poorly known (from Cuba, Jamaica, and Colombia); only *A. denticulata,* the sole Mexican and Central American species, is widespread. The affinities of *Arachniodes* are probably with *Dryopteris* and *Polystichum* (Tindale, 1961), or perhaps *Ctenitis* (Morton, 1960).

References: Morton C. V. 1960. Observations on cultivated ferns VI. The ferns currently known as *Rumohra*. Amer. Fern J. 50:145–155; Tindale, M. D. 1961. Pteridophyta of south eastern Australia. Contr. New South Wales Natl. Herb., Fl. Ser. 211:47–78.

1. **Arachniodes denticulata** (Swartz) Ching, Acta Bot. Sinica 10:260. 1962.

—*Polypodium denticulatum* Swartz, Prodr. Veg. Ind. Occ. 134. 1788. —*Dryopteris denticulata* (Swartz) O. Ktze., Rev. Gen. Pl. 2:812. 1891. —*Byrsopteris denticulata* (Swartz) Morton, Amer. Fern J. 50:152. 1960. —Type: Jamaica, *Swartz s.n.* (S; isotype C).

Aspidium jucundum Fée, Mém. Fam. Foug. 10:41. 1865. —Lectotype (chosen by Christensen, Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:115. 1920): Mexico, *Galeotti 6563* (presumably P; isotype BR, photo UC!).

Illustration: **Fig. 8**; Christensen, Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:114, fig. 25a. 1920.

Rhizome short-creeping to suberect; scales of rhizome apex and stipe base numerous, lanceolate, 1–2 (3) cm long, 1–2 mm wide, castaneous, glossy, concolorous, entire; stipe reddish brown at base, usually equaling or longer than blade; fronds mostly (30) 50–90 cm long, lowermost pinnae strongly basiscopically produced; pinnae alternate, rachis sometimes subflexuous; ultimate segments obovate to oblanceolate, 5–8 mm long, 3–4 mm broad, cuneate at base, margins lobed and with aristate teeth; leaf tissue chartaceous to subcoriaceous, dark green above, lighter green below; indusia tan to reddish brown, glabrous, ca. 1–2 (3) mm diam.; $n = 41$ (Oax., Chis.), 82 (Jam.).

Terrestrial in Montane Rain Forest, Evergreen Cloud Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, Sierra Madre; (1200) 1600–2800 m. Southern Mex. (Hgo., Ver., Oax.); Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., s Braz.); Cuba, Jam. Chiapas Collections: *P 7424* (UC); *P 10319* (UC, US); *JTM 1234* (US); *An s.n.* (US); *G 354* (PH); *P 42* (US); *P 6723* (UC, US); *EM 4269* (MEXU, US); *GM 109* (US); *MC 2432* (US); *MC 1666* (US); *X&S X-464* (US); *T&L 41452, 41637* (DS); *6719*; *7807*; *12936*; *15298*; *15358*; *21515*; *25026*; *25432*; *26255*; *30092*; *31312*; *31781*; *31984*; *32276*; *32423*; *33561*; *34548*; *34805*.

Christensen (Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:112. 1920) listed numerous forms and varieties of this polymorphic species. The two chromosome counts available indicate that polyploidy is a part of this variability. Christensen's forms seem to be connected by numerous intermediates, so I do not apply an infraspecific name to the Chiapas collections, which are all rather uniform.

11. ASPLENIUM

Asplenium L., Sp. Pl. 2:1078. 1753. —Lectotype (chosen by J. Smith, Hist. Fil. 316. 1875): *Asplenium marinum* L.

Plants terrestrial, saxicolous, or epiphytic; rhizome mostly short-creeping to erect, dictyostelic; rhizome apex scales usually conspicuous, often clathrate (lateral walls dark brown to blackish, external walls hyaline); stipe often narrowly to broadly alate, with 2 back-to-back C-shaped vascular bundles (cross section) that fuse distally; blade simple to decompound, rachis adaxially ridged or green-alate; pinnae often inequilateral, excavate on lower side, truncate, angulate, or auriculate on superior side; veins mostly free, simple or forking, ending in a clavate tip (as seen adaxially) short of margin; leaf tissue essentially glabrous on both sides, in a few species with clathrate scales or minute inconspicuous hairs; sori dorsal on the veins, oblong to usually linear; indusia persistent, covering sorus when young, reflexed when sporangia mature, usually entire, whitish to tan, glabrous;

sporangia with a long slender stalk made up of a single file of cells; spores bilateral, monolete, usually with a cristate perispore; $x = 36$ (40 in one or perhaps a few species).

Copeland (1947) listed numerous generic synonyms for *Asplenium*; few of these have been used by pteridologists in recent years, and I accept only *Phyllitis* in this treatment, not out of conviction that it is any more distinct than many other species groups in *Asplenium* s.l., but for convenience.

No one has ever satisfactorily split *Asplenium* (an unwieldy subcosmopolitan genus of perhaps 700 species) into natural groups. Certainly such groups exist, but invariably one finds intermediate species that are transitional to other species groups. Morton and Lellinger (1966) recognized two sections for Venezuela: sect. *Asplenium,* containing the bulk of the species, and sect. *Sphenopteris* Mett. (containing *A. praemorsum* and *A. serra* in our area), with sori at an acute angle to costa and scaly axes. Certainly another natural group is the *Asplenium trichomanes* group (Maxon, 1913), well represented in Chiapas by nine species. Additional groups in Chiapas are the *A. radicans* complex (3 spp.), the *A. achilleifolium* group (containing also *A. commutatum* and *A. solmsii*), and the *A. auritum-cuspidatum* complex (containing perhaps *A. fournieri*). The last is the most taxonomically difficult group in Chiapas with about six species in our area.

REFERENCES: MAXON, W. R. 1913. Contr. U.S. Natl. Herb. 17:134–153; MORTON, C. V., AND D. B. LELLINGER. 1966. The Polypodiaceae subfamily Asplenioideae in Venezuela. Mem. New York Bot. Gard. 15:1–49.

a. Blade undivided.

b. Blade tapering to the rhizome, or nearly so; sori single along veins; blade crenate-serrate toward tip .... 44. *A. serratum*

bb. Blade ending below in a subcordate base; sori arranged in pairs along veins; blade entire toward tip .... *Phyllitis lindenii*

aa. Blade pinnate to tripinnate or more.

c. Veins and sori at a very narrow acute angle to costa, sometimes almost parallel; stipe and rachis more or less scaly.

d. Rhizome erect; blade bipinnate or more dissected .... 35. *A. praemorsum*

dd. Rhizome creeping; blade simply pinnate, pinnae lacerate or serrate .... 43. *A. serra*

cc. Veins and sori not at a very narrow acute angle to costa; stipe and rachis glabrous or with only scattered, minute, hairlike scales (except for *A. achilleifolium* and *A. commutatum,* which see).

e. Stipe and rachis green, stramineous, or reddish brown, not atropurpureous and shining (if dark, then dull).

f. Apex of blade flagelliform or with a terminal proliferous bud.

g. Rachis and stipe apex with thin green wings over 1 mm broad .... 3. *A. alatum*

gg. Rachis and stipe not winged or with only very narrow wings.

h. Blade ending abruptly in a large bud; fronds longer than 45 cm; terrestrial ... 8. *A commutatum*

hh. Blade with a flagelliform tip that ends in a bud; fronds mostly shorter than 15 cm; epipetric.

i. More developed pinnae pinnatifid; indusia whitish .... 14. *A. exiguum*

ii. Pinnae entire to erose; indusia tan .... 21. *A. harrisii*

ff. Apex neither flagelliform nor with a terminal bud.

j. Blade simply pinnate with a conform terminal pinna.

k. Pinnae obviously toothed or lobed; terrestrial or epiphytic.

l. Indusia relatively short and thick, only 2–4 times longer than broad, whitish ... 16. *A. feei*

ll. Indusia linear, many times longer than broad, whitish or darkened.

m. Pinnae auriculate at acroscopic base, upper base ± parallel to rachis, lower base perpendicular; fronds drying dark green to blackish; indusia darkened .... 40. *A. repandulum*

mm. Pinnae cuneate at base, not auriculate; fronds drying a lighter green; indusia whitish .... 49. *A. tuerckheimii*

kk. Pinnae entire or nearly so; epiphytic.

n. Rhizome scales small, mostly shorter than 5 mm; rachis subterete; pinnae 7–12 pairs, mostly less than 2 cm broad .... 15. *A. falcinellum*

nn. Rhizome scales larger; rachises flattened, subcarnose; pinnae mostly 5–7 pairs, mostly more than 2 cm broad .... 25. *A. juglandifolium*

jj. Blade pinnate to tripinnate, without a conform terminal pinna.

o. Blade simply pinnate, pinnae only shallowly lobed, not cut more than one-half to costa.

p. Plants epiphytic.

q. Veins mostly simple except for acroscopic basal ones; leaf tissue thin.

r. Pinnae long-attenuate at apex; rachis narrowly green-winged; common, in Chis. 1700–2800 m .... 20. *A. harpeodes*

rr. Pinnae acute or acuminate at apex; rachis broadly green-winged; uncommon, in Chis. below 800 m .... 36. *A. pteropus* qq. Veins mostly 1–2-forked; leaf tissue thin to thick or fleshy.

s. Leaf tissue thin .... 52. *A. williamsii*

ss. Leaf tissue thick or fleshy.

t. Leaf tissue dark green or bluish green; indusia thick, whitish; pinnae cuneate to truncate at acroscopic base.

u. Pinnae entire to serrate to lacerate; 64 small, reniform, tan spores per sporangium .... 5. *A. auritum*

uu. Pinnae with an acroscopic basal auricle cut nearly to costa, otherwise crenate-serrate to incised one-third or less; 32 large, subglobose, dark brown spores per sporangium ...... 30. *A. monodon*

tt. Leaf tissue yellowish green; indusia thin, whitish to tan; pinnae subcordate at acroscopic base, auricle often overlapping rachis.

v. Veins simple or 1-forked; blade less than 6 (9) cm broad; pinnae with 10–17 teeth on upper margin .... 4. *A. auriculatum*

vv. Veins mostly 2-forked; blade mostly 12–20 cm broad; pinnae with 17–30 teeth on upper margin .... 42. *A. salicifolium*

pp. Plants terrestrial or epipetric.

w. Blade triangular or pentagonal in outline, lowest pinnae basiscopically developed; leaf tissue with whitish multicellular hairs .... 37. *A. pumilum*

ww. Blade ovate-lanceolate to linear, lower pinnae not basiscopically developed; leaf tissue glabrous.

x. Rhizome creeping (see also *A. laetum*).

y. Rhizome long-creeping; veins 1-forked; sori all asplenioid; leaf tissue drying dark greenish black .... 40. *A. repandulum*

yy. Rhizome short-creeping; veins 3–4-forked; sori occasionally diplazioid; leaf tissue drying greenish .... 12. *A. delitescens*

xx. Rhizome suberect to erect; leaf tissue drying greenish.

z. Blade linear, 15 (25) cm long or less, less than 3 cm wide, 6 or more pairs of lateral pinnae.

a′. Pinnae dentate or serrate along upper margin and tip; fronds subdimorphic, the sterile spreading in a basal rosette, the fertile erect, longer; low elevation (300–800 m) .... 13. *A. dentatum*

aa′. Pinnae subentire to erose along margin; fronds monomorphic; high elevation (2800 m) .... 21. *A. harrisii*

zz. Blade deltoid-lanceolate to linear, usually longer than 15 cm, 3 cm broad, if less, then with fewer than 6 pairs of lateral pinnae.

b′. Pinnae 10 or fewer pairs; stipe stramineous to greenish, occasionally becoming tan.

c′. Pinnae 1–5 lateral pairs, less than 1.5 times longer than wide, obtuse .... 51. *A. virillae*

cc′. Pinnae mostly 5–9 lateral pairs, more than 1.5 times longer than wide, acute or obtuse at tip.

d′. Pinnae acute at tip; upper and most of lower margin of pinnae sharply serrate or biserrate; leaf tissue chartaceous .... 1. *A. abscissum*

dd′. Pinnae obtuse at tip; upper pinna margin crenate, the lower base excised and perpendicular to rachis for about half pinna length; leaf tissue membranaceous .... 23. *A. hoffmannii*

bb′. Pinnae mostly more than 10 lateral pairs; stipe brownish to atropurpureous.

e′. Rhizome short-creeping; pinnae usually 10–20 pairs; lowermost pinnae not reduced or deflexed; pinna margin shallowly crenate-serrate .... 26. *A. laetum*

ee′. Rhizome erect; pinnae mostly 20–30 (or more) pairs; lowermost 1–4 pairs of pinnae slightly reduced and deflexed; upper pinna margin sharply and rather deeply serrately incised .... 28. *A. miradorense*

oo. Blade deeply bipinnatifid to bipinnate or tripinnate.

f′. Blade strongly reduced at base, often to within a few cm of rhizome; leaf tissue thin.

g′. Rachis budding, often producing small plants toward tip of frond.

h′. Blade linear in outline, acroscopic basal segment cut to costa or nearly so, obovate, rest of pinna shallowly lobed .... 45. *A. sessilifolium*

hh′. Blade elliptic in outline, deeply bipinnate-pinnatifid, ultimate segments ca. 1 mm wide .... 31. *A. munchii*

gg′. Rachis without buds.
i′. Blade abruptly reduced below, with several pairs of very reduced pinnae; fronds mostly longer than 30 cm; ultimate segments acute at tip .... 10. *A. cristatum*
ii′. Blade gradually reduced below, reduced pinnae often nearly to rhizome; fronds mostly shorter than 20 cm; ultimate segments rounded at tip .... 32. *A. myriophyllum*
ff′. Blade not strongly reduced at base, truncate, or lower pinnae only slightly reduced; leaf tissue thin to thick.
j′. Fronds less than 12 cm long, 6 cm wide; leaf tissue very thin; low elevations, below 1000 m .... 19. *A. fournieri*
jj′. Fronds mostly longer than 12 cm; leaf tissue chartaceous to thick, subcoriaceous; mostly above 1000 m.
k′. Plants terrestrial; leaf tissue chartaceous.
l′. Rhizome short-creeping; blade at the base 3-pinnate-pinnatifid; rachis glabrous .... 6. *A. breedlovei*
ll′. Rhizome erect; blade 2–3-pinnate; rachis glabrous or scaly.
m′. Rachis with few to many clathrate scales.
n′. Pinnules adnate, not or only slightly narrowed at their base, decurrent; blade without buds .... 2. *A. achilleifolium*
nn′. Pinnules narrowed (cuneate) at their base; blade ending in a terminal bud .... 8. *A. commutatum*
mm′. Rachis glabrous or nearly so.
o′. Blade bipinnate, the pinnules with an acroscopic lobe, otherwise dentate or bidentate .... 24. *A. insolitum*
oo′. Blade bipinnate-pinnatifid to tripinnate.
p′. Pinnules decurrent, oblique to costa, basal ones not overlapping rachis; pinnae stalked 2–5 mm .... 47. *A. solmsii*
pp′. Pinnules not strongly decurrent, spreading, basal ones often overlapping rachis; pinnae sessile .... 10. *A. cristatum*
kk′. Plants epiphytic; leaf tissue thick.
q′. Blade deeply bipinnatifid, or if bipinnate the pinnules obovate, obtuse, entire or slightly toothed at apex.
r′. Blade linear-lanceolate; pinnae subhorizontal; up to 12 pairs of nearly free, obovate pinnules per pinna; spores large, subglobose, 32 per sporangium .... 48. *A. sphaerosporum*
rr′. Blade deltoid-lanceolate; pinnae ascending; only basal pinnules obovate and free, distal part of pinnae merely deeply incised; spores small, reniform, 64 per sporangium .... 38. *A. pyramidatum*
qq′. Blade bipinnate to quadripinnate, if only bipinnate, the pinnules elongate, narrow, sharply toothed .... 11. *A. cuspidatum*
ee. Stipe and rachis dark or atropurpureous, shining.
s′. Blade simply pinnate; proliferous buds present or absent; pinnae often articulate.
t′. Blade 4–8 cm broad; pinnae fewer than 20 pairs.
u′. Pinnae usually acute at tip; lowermost pinnae not reduced .... 26. *A. laetum*
uu′. Pinnae rounded at tip; lowermost several pairs of pinnae reduced, rounded-deltoid .... 27. *A. lamprocaulon*
tt′. Blade generally less than 4 cm broad; pinnae often greater than 20 pairs.
v′. Fronds flagelliform and/or proliferous at or near tip.
w′. Larger pinnae deeply incised; fronds flagelliform at tip with a terminal bud .... 14. *A. exiguum*
ww′. Larger pinnae subentire to crenulate; fronds flagelliform or not.
x′. Fronds producing a subterminal bud along rachis; pinnae to 2 cm long, oblong .... 34. *A. polyphyllum*
xx′. Fronds flagelliform at the tip; pinnae roundish, to 4 mm long, 3 mm broad .... 46. *A. soleirolioides*
vv′. Fronds neither flagelliform at tip nor proliferous.
y′. Upper margin of pinnae deeply incised; sori along lower margin only .... 18. *A. formosum*
yy′. Upper margins entire, crenate, or serrate; sori along both margins or along only lower margin.
z′. Sori along both sides of costa, mostly 3 (2) or more pairs per pinna.

a″. Leaf tissue thick, subcoriaceous; pinnae entire to serrulate, often deflexed; mostly above 1400 m .... 41. *A. resiliens*
aa″. Leaf tissue thin; pinnae spreading.
b″. Pinnae serrulate to crenate-dentate along upper margin; stipe and rachis blackish; below 1400 m .... 22. *A. heterochroum*
bb″. Pinnae subentire; stipe and rachis reddish brown to castaneous; ca. 3800 m .... 7. *A. castaneum*
zz′. Sori along only lower side of costa, or with only a single pair of sori (if several pairs of sori, then pinnae longer than 1 cm).
c″. Pinnae fewer than 15 pairs, 8 mm long or less; leaf tissue olivaceous; sori 1–2 per pinna .... 33. *A. olivaceum*
cc″. Pinnae more than 15 pairs, mostly longer than 8 mm; leaf tissue green; sori 1–4 on lower margin, occasionally also along distal side of costa .... 29. *A. monanthes*
ss′. Blade subbipinnate to tripinnate, with flagelliform apex; terrestrial or epiphytic.
d″. Stipe very short, mostly 1–2 cm long; blade reduced at base, tripinnate; epiphytic .... 9. *A. conquisitum*
dd″. Stipe mostly longer than 10 cm; blade not reduced at base, simply pinnate to tripinnate; terrestrial.
e″. Fronds subbipinnate, pinnae lobed, basal lobes nearly free .... 39. *A. radicans*
ee″. Fronds 2–3 pinnate.
f″. Blade bipinnate, pinnules dentate .... 17b. *A. flabellulatum* var. *partitum*
ff″. Blade bipinnate-pinnatifid.
g″. Larger pinnules with at least a single free flabellate acroscopic basal segment .... 17a. *A. flabellulatum* var. *flabellulatum*
gg″. Blade fully tripinnate, ultimate segments linear-oblong to obovate, ca. 4 mm by 1 mm .... 50. *A. uniseriale*

1. **Asplenium abscissum** Willd., L. Sp. Pl., ed. 4, 5:321. 1810.

—LECTOTYPE (chosen by Morton and Lellinger, 1966:26): Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19893-1 and 19893-2; photos BM! US); the lectotype was further restricted to 19893-1 by Proctor (Fl. L. Antill. 2:320. 1977). Contrary to Morton and Lellinger, these two sheets are labelled "Habitat in India Occidentale," without notation of collector.

Asplenium polymorphum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):56, pl. 15, fig. 2. 1842. —TYPE: Mexico, Veracruz, Zacuapán, *Galeotti 6295* (BR!; isotypes BR—2! K! P—2!).

Asplenium firmum Kunze, Bot. Zeitung (Berlin) 3:283. 1845. —LECTOTYPE (chosen by Morton and Lellinger, 1966:25): Venezuela, Caracas, *Moritz s.n.* (B).

ILLUSTRATIONS: Small, Ferns SE States 157. 1938; Eaton, Ferns No. Amer. 2:pl. 80, figs. 15–17. 1880; Proctor, Fl. L. Antill. 2:311. 1977.

Rhizome suberect to erect, sparingly scaly; fronds 2–6, fasciculate, 12–40 (50) cm long, 4–16 cm broad, gradually tapering distally, with a hastate, confluent apical segment; stipe greenish or tan, about equaling blade; rachis greenish, narrowly winged, not proliferous; blade 1-pinnate, not reduced at base; pinnae 5–9 (12) pairs, sessile to short-petiolulate, 8–18 mm broad, acute or subattenuate, subtruncate at upper base, not auriculate, excised at lower base, the margins biserrate; veins mostly 2-forked; leaf tissue membranaceous to chartaceous, glabrous; sori inframedial to medial, with narrow, tan, entire indusia; $n = 36$ (Jam., Fla.), 72 (Oax.), ca. 144 (P.R.).

In woods and along banks, occasionally on rocks, in Tropical, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; common in Northern and Eastern highlands, E edge of Central Plateau, Sierra Madre; 300–2000 m. Southern Mex. (Jal., Oax., Ver.), Guat., Nic., C.R., Pan.; S.A. (Ven.); Fla., Antill., Trin. CHIAPAS COLLECTIONS: *G s.n.* (YU); *21654*; *21800*; *21873*; *22178*; *22251*; *22503*; *22508*; *24921*; *25070*; *30177*; *31307*; *31503*; *31987*; *32858*; *33105*; *34176*; *34381*; *35258*; *38022*; *38084*; *41994*.

This species, as do some other spleenworts, apparently has the potential to become fertile at an extremely small size. *Breedlove 22475* (26–28 km N of Ocozocoautla, on mossy, calcareous rocks) has fronds only 1–3 cm long, with 0–2 pairs of small lateral pinnae and a larger hastate terminal segment; nevertheless, fronds were invariably fully fertile. More typical specimens of *A. abscissum* have been collected from the same area (*21873*; *22503*; *22508*). I originally identified *22475* as *A. minimum* Mart. & Gal., syntypes from Veracruz and Oaxaca. The Chiapas specimen agrees fairly well with Martens and Galeotti's illustration and description except that the stipes of *A. minimum* were described as shining. Christensen (Ind. Fil. 121. 1905) reduced *A. minimum* to synonymy under *A. pumilum*, and I believe this is most likely.

Large specimens of *A. abscissum* closely resemble plants of *A. delitescens* in blade shape and size. The two can be readily distinguished by the difference in rhizome habit.

2. **Asplenium achilleifolium** (Mart. & Gal.) Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:249. 1849.

—*Caenopteris achilleifolia* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):63, pl. 16. 1842. —SYNTYPES: Mexico, Veracruz, vicinity of Mirador, *Galeotti 6279, 6293* (both BR!; isosyntypes P! K!, *Galeotti 6279* only).

Athyrium conchatum Fée, Gen. Fil. 188, pl. 17C, fig. 1. 1852. —*Asplenium conchatum* (Fée) Moore, Ind. Fil. 49. 1857. —TYPE: Mexico, "ad craterem Cerro Sancti Martini," *Galeotti 6569* (holotype not found at P; isotype K!).

Asplenium grande Fée, Mém. Fam. Foug. 8:82. 1857. —

Type: Mexico, Veracruz, "barranca de San Martin et de San Francisco, près de Mirador," *Schaffner 74* (not found at P).

Illustrations: see those under accepted name and synonym cited above.

Rhizome suberect, apex with castaneous, ± opaque scales; fronds several, 50–100 (120) cm long to 26 cm broad, deltoid-lanceolate, with an acuminate apex; stipe ca. ⅔ blade length, 2–4 mm diam., grayish brown, dull, with scattered subpersistent clathrate scales; rachis glabrescent to persistently clathrate-scaly; blade with lowest pinnae largest or nearly so, not proliferous; largest pinnae to 15 cm long, 2–5 cm broad, pinnate at base, deeply pinnatifid toward apex, long-acuminate at tip, pinnules broadly adnate, oblique, decurrent, only slightly or not at all narrowed at base, connected to adjacent pinnules by a narrow to broad costal wing; pinnules serrately incised to about one-half their width; leaf tissue dark green, glabrous, chartaceous; sori 2–3 mm long, up to 8 pairs per pinnule, with a large convex elliptic indusium.

On forest floor in Montane Rain Forest and Pine-Oak-Liquidambar Forest (rarely Evergreen Cloud Forest, Seasonal Evergreen Forest); locally common in Sierra Madre and Northern Highlands (Jitotol Ridge), less common in Central Plateau, Eastern Highlands; (800) 1500–2300 (2600) m. Southern Mex. (Nay., Jal., Oax., Ver.), Guat., Hond., Salv. Chiapas Collections: *EM 15413* (F, MEXU); *EM 5434* (MEXU); *GM s.n.* (DS, US); *G 369a* (BM, K, NY, PH); *22244*; *22654*; *23108*; *24975*; *25235*; *25385*; *26053*; *31676*; *32615*; *34375*; *34388*; *34611*; *42565*. Also *21710*; *24715*; *24917*; *31323* from Cerro Baul (see discussion below).

A highly variable species that seemingly grades into *A. commutatum* in the western part of its range. Most Chiapas specimens are easily distinguished from *A. commutatum* by the lack of rachis buds, pinnules broadly adnate to the rachis and less deeply incised, fewer rachis scales (rachis often glabrescent), and dark-castaneous rhizome scales. Also, *A. achilleifolium* occurs primarily in Montane Rain Forest, mostly below 2000 m, while *A. commutatum* nearly always occurs in Evergreen Cloud Forest, above 2000 m. Specimens from the vicinity of Cerro Baul (cited above) are more or less intermediate in blade dissection between the two species. I tentatively place them here on the basis of their habitat, lack of buds, and partially adnate pinnules. Further investigation, especially cytological, might prove fruitful.

3. **Asplenium alatum** Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:319. 1810.

—Type: Venezuela, Caripe, *Humboldt & Bonpland s.n.* (B—Herb. Willd. 19889).

Illustrations: Hooker & Greville, Icon. Fil. 2:pl. 137. 1829; Lowe, New and Rare Ferns pl. 12. 1862.

Rhizome erect; fronds fasciculate, 27–55 cm long, ca. 8 cm wide; stipe and rachis broadly green-winged, wing more than 1 mm wide on both sides, rachis extended at apex with a terminal bud, buds sometimes producing plantlets; pinnae mostly 16–22 pairs, ± truncate and subequal at base (sometimes subcordate), exauriculate or with an inconspicuous superior auricle, obtuse or acute at tip, biserrate along margin; veins 1–2-forked; leaf tissue herbaceous, dark green; sori inframedial; indusia linear, green, entire; *n* = 36 (Jam.).

Terrestrial, along streams in Montane Rain Forest, Evergreen Cloud Forest; locally common in Northern Highlands (Jitotol Ridge), widely scattered in Central Plateau; 1250–2700 m. Southern Mex. (Ver., Oax.), Guat., Nic., C.R.; S.A. (Col. and Ven. to Bol., s Braz.); Jam., Hisp. Chiapas Collections: *R&R&M 1247* (US); *GM 129* (US); *26081*; *26083*; *32381*; *32623*; *33683*; *34685*; *35400*; *38952*.

A near ally is *A. rosenstockianum* Brade, from Costa Rica, also bearing a bud at the apex, but with veins simple and pinna margins regularly simply serrate.

4. **Asplenium auriculatum** Swartz, Kongl. Vetensk. Acad. Handl. 1817:68.

—Type: Brazil, Minas Gerais, *Freyreis s.n.* (S; isotypes BM, BR—photo BM!).

Asplenium semicordatum Raddi, Pl. Bras. 1:36, pl. 52, fig. 1. 1825. —Type: Brazil, "Provinciae Rio de Janeiro," *Raddi s.n.* (isotypes FI).

Asplenium pimpinellifolium Fée & Schaffner ex Fée, Mém. Fam. Foug. 7:52, pl. 25, fig. 5. 1857. —Type: Mexico, Veracruz, Huatusco, *Schaffner 50* (isotype K!).

Illustrations: see those cited with synonyms.

Rhizome erect; fronds 8–25 (40) cm long, 3.5–9 cm broad, 1-pinnate, apex often attenuate or caudate; stipe greenish or gray-green to brown, dull, ¼–⅔ blade length, glabrous; rachis very narrowly alate, not proliferous; pinnae 8–14 pairs, petiolulate 1–2 mm, inequilateral, mostly 2–3 (5) cm long, 0.6–1.0 cm broad, superior base auriculate, auricle sometimes overlapping rachis, lower base straight for ca. 1 cm, upper margin crenate or bicrenate, obtuse to acute at tip; veins simple except for those of auricle; leaf tissue yellow-green, usually somewhat fleshy when living, glabrous; sori ca. 2–5 mm long, in 2–5 pairs; *n* = 72 (Oax.).

Epiphytic, on logs and in trees (rarely on rocks) in Lower Montane and Montane rain forests, Evergreen Cloud Forest (rarely Pine-Oak-Liquidambar Forest); common in Sierra Madre, Northern and Eastern highlands, Central Plateau; 800–2800 m. Southern Mex. (Ver., Oax.), Guat., Salv., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., s Braz.); Cuba, Guadeloupe. Chiapas Collections: *Dr 1606* (GH, MEXU, US); *R 840* (MEXU, NY, PH); *R&R&M 1221* (US); *G 425* (K, NY); *P 6734* (NY, UC, US); *P 6737* (BM, UC, US); *Z 428* (DS); *GM 128* (DS, US); *X&S X-416A* (US); *T&L 41446* (DS); *T&L 41756* (DS); *Ra 20017* (DS, US); *15202*; *21500*; *21682*; *22600*; *23106*; *23216*; *24974*; *25754*; *26300*; *26779*; *29213*; *29879*; *30075*; *30185*; *30801*; *31502*; *31632*; *31878*; *32202*; *32619*; *33058*; *33551*; *34403*; *34699*; *38026*; *41097*; *42507*.

Proctor (Fl. L. Antill. 2:321. 1977) treats this as a variety of *A. salicifolium,* which is indeed closely related. In Mexico the two species seem to be readily distinguishable in habitat and morphologically.

5. **Asplenium auritum** Swartz, J. Bot. (Schrader) 1800(2):52. "1801" [1802].

—Type: Jamaica, *Swartz s.n.* (S).

Asplenium levyi Fourn., Bull. Soc. Bot. France 19:257. 1872. —Type: Nicaragua, Chontales, *Lévy 474* (P—2 sheets!).

Illustrations: Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4: pl. 14, figs. 7–8. 1897.

Rhizome suberect; fronds to 40 cm long, not proliferous; stipe about one-half to nearly as long as blade, 1–2 mm diam., greenish adaxially, darkened (to blackish) below; blade 1-pinnate, 3–12 cm wide, deltoid-lanceolate, gradually reduced distally to an acuminate confluent apex; rachis narrowly or not at all greenish-alate; pinnae 8–25 pairs, the lowest the largest, subsessile to stalked ca. 2 mm, acute at tip, unequally cuneate at base or auriculate at superior base (sometimes also at inferior base), auricle rounded to acute, serrulate; margins of pinnae subentire to serrate; leaf tissue thick, dark green or bluish green; sori to ca. 12 pairs per pinna, on both sides of costae; indusia whitish; spores reniform, tan in mass, 64 per sporangium.

On trees or logs, or on wet rocks, in Seasonal Evergreen Forest, Tropical and Lower Montane rain forests; relatively common in s Pacific Coastal Plain, lower elevations of Northern and Eastern highlands; 200–500 m. Range uncertain, but at least Chis., Bel., Guat., Hond., C.R., Pan.; S.A. (Col., Ven., Guy.); Jam. CHIAPAS COLLECTIONS: *P 6732* (NY, US, UC); *P 6862* (UC, US); *C&D 239* (US); *R 56* (US, PH); *EM 18390* (DS, MEXU, US); *28587*; *33198*; *34190*; *34490*; *35061*.

With some trepidation, I depart from nearly all other recent authorities and treat this species in a restricted sense. Morton and Lellinger (1966) recognized *A. auritum* in a broad sense, encompassing everything from simply pinnate to fully bipinnate forms. I believe that there is sufficient morphological, palynological, and ecological data at hand to attempt a division, albeit tentative, of this difficult complex. Herein, I recognize four species: *A. auritum* s.s., *A. monodon*, *A. pyramidatum*, and *A. sphaerosporum*. *Asplenium auritum* s.s. differs from the two last-named species in being simply pinnate with pinnae entire or at most serrate but usually auriculate at the superior base. *Asplenium monodon* has a basal superior auricle that is cut nearly to the costa, the remainder of the pinna margin being crenate-serrate or at most incised about one-third; stipes and rachises are often blackish and the blade is usually narrower than in *A. auritum* s.s.

Differences in spore morphology and number per sporangium provide additional information on which to base a separation. *Asplenium auritum* and *A. pyramidatum* consistently have small reniform spores (tan in mass), 64 per sporangium. *Asplenium monodon* and *A. sphaerosporum* both have large, globose, blackish spores, 32 per sporangium. Size and shape differences are easily discernible at 30 times magnification. These spore differences suggest ploid differences among the four species. Unfortunately, there are too few chromosome reports for species of this complex. Walker (Trans. Roy. Soc. Edinburgh 66:221. 1966) reported $n = 72$ and $2n = 144$ for the "typical form" (var. *auritum*?) from Jamaica, but 288I at meiosis for a "more fleshy" form, var. *macilentum* (*A. monodon* of this work?). However, the plants producing univalents were able to complete their life cycle, producing viable spores that give rise to prothalli. Proctor's observations are compatible with my finding of large, globose (unreduced?) spores, 32 per sporangium, in *A. monodon*. There are two other counts for *A. auritum* s.l.: $n = 72$ for a Florida plant (Wagner, Amer. Fern J. 53:1–16. 1963), and $n = 72$, $2n = 144$ for a Galápagos specimen (Jarrett et al., Kew Bull. 22:476. 1968).

In Chiapas, *A. auritum* grows at the lowest elevation of any of the four species (200–500 m); *Asplenium monodon* has been found in similar associations (but so far not growing with *A. auritum*) at about the same elevations (300–900 m); *Asplenium pyramidatum* occurs at slightly higher elevations (600–1000 m, perhaps to 1600 m) mostly in Lower Montane Rain Forest; while *A. sphaerosporum* occurs at the highest elevation [(900) 1250–2700 m], primarily in Montane Rain Forest and Pine-Oak-Liquidambar Forest.

6. **Asplenium breedlovei** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:209, fig. 1, a–b. 1975.

—TYPE: Mexico, Chiapas, Munic. Villa Corzo, E base of Cerro Tres Picos, *Breedlove 30041* (DS!).

ILLUSTRATION: only the original, p. 210.

Rhizome short-creeping, ca. 4 mm diam., bearing few (1–3) fronds; stipe atropurpureous or brownish, dull, glabrous, ca. 2 mm diam., nearly equaling blade; rachis slightly flexuous, darkened at base, greenish towards apex; blade at base nearly 4-pinnate, up to 35 cm long, 15 cm wide, deltoid, gradually tapering towards apex, not proliferous; pinnae up to ca. 10 pairs, dark green, not articulate, alternate, ascending, to 10 cm long, 3 cm wide, greenish in axils; penultimate segments cuneiform, mostly 2–5-lobed; ultimate segments to 1.5 mm wide, tips acute or subacute; sori along veins of ultimate segments, to ca. 3 mm long; indusia entire or slightly erose, ca. 0.6 mm wide, tan.

Terrestrial, now known from several collections, the type and at least four collections from Guatemala [e.g., Dept. Santa Rosa, Vol. Tecuamburro, *Heyde & Lux s.n.*, Donn.-Smith ed. 4674 (K!, US)]; Montane Rain Forest, Pine-Oak-Liquidambar Forest; Sierra Madre; 1500–1800 m.

7. **Asplenium castaneum** Schlecht. & Cham., Linnaea 5:611. 1830.

—TYPE: Mexico, Veracruz, Mt. Orizaba, *Schiede s.n.*

Asplenium rubinum Davenpt., Bot. Gaz. (Crawfordsville) 19:391. 1894. —TYPE: Mexico, Edo. México, Sierra de las Cruces, *Pringle 5191* (NY?; isotype US).

ILLUSTRATIONS: Matuda, Anales Inst. Biol. Univ. Nac. México 27:145. 1956; Maxon (1913:146).

Rhizome compact, erect; fronds numerous (10–20 or more), fasciculate, 10–30 cm long; stipe (2) 6–17 cm long, stout, often ca. 1–2.5 mm diam., castaneous, shining, glabrous; rachis resembling the stipe; blade linear, scarcely narrowed below, evenly reduced distally into a minute terminal segment; pinnae 20–30 pairs, roundish to elliptic to nearly quadrangular, not strongly dimidiate, mostly less than 7 (10) mm long, 5 mm wide, entire or faintly crenate, the larger subauriculate; leaf tissue glabrous; sori 2–6 pairs per pinna, on both sides of costa, 1–2 mm long; indusia very broad (nearly 1 mm), erose to subentire, whitish to tan.

Terrestrial or saxicolous, in our area known only from rock crevices near the summit of Vol. Tacaná; s Sierra Madre; 3600–4000 m. Mexico (Jal., D.F., Méx., Ver., Oax.), Guat.; S.A. (Ven., Ecu. to Bol., Chile). CHIAPAS COLLECTIONS: *EM 2353* (K, MEXU, US); *EM 2381* (MEXU); *EM 2884* (MEXU); *24289*; *26716*; *29323*.

8. **Asplenium commutatum** Mett. ex Kuhn, Linnaea 36:99. 1869.

—SYNTYPES: Mexico, *Schaffner s.n.*; Oaxaca, *Galeotti 6555*; Veracruz, Orizaba, *Müller s.n.* Guatemala, *Salvin & Godman 67, 93*; *Skinner s.n.* [all presumably B; probable isosyntype of *Schaffner s.n.* (K!), *Galeotti 6555* (K!), *Müller s.n.* (BM!); photos of *Schaffner* and *Müller* syntypes at BM!].

Athyrium macrocarpon Fée, Gen. Fil. 188. 1852. —*Asplenium macrocarpon* (Fée) Moore, Ind. Fil. 143. 1859 (not Desv., 1827). —TYPE: Mexico, Oaxaca, Llano Verde, *Galeotti 6555* (presumably P, not found; isotype K!).

Asplenium cicutarium Swartz var. *paleaceum* Davenp., Bot. Gaz. (Crawfordsville) 19:390. 1894. —*Asplenium eatonii* Davenpt., Bot. Gaz. (Crawfordsville) 21:258. 1896. —TYPE: Mexico, Jalisco, Colima Mts., *Pringle 5531* (presumably NY).

Asplenium onustum Christ, Prim. Fl. Costar. 3:24. 1901. —Type: Costa Rica, Copey, *Tonduz s.n.* [Herb. Inst. Physio-geogr. Nat. Costar. 11931] (BR! not found at P).

Asplenium subvestitum Copel., Univ. Calif. Publ. Bot. 19:289, pl. 39. 1941. —Type: Mexico, Guerrero, Dist. Mina, w of Petlacala, *Mexia 9065* (UC! isotype K!).

Illustration: only that cited under synonym.

Rhizome erect, scaly at apex, scales tan, not strongly clathrate; fronds several to few, 45–100 cm long, to ca. 22 cm broad, nearly always with a large terminal scaly bud or less often with several subterminal rachis buds; stipe to 35 cm long, 3–5 mm broad, brownish, persistently scaly, with numerous old decayed stipe bases; rachis brown, chaffy with small clathrate scales; blade lanceolate, lowest pair of pinnae largest or slightly shorter than the next and deflexed; pinnae to ca. 20 pairs, the largest 8–13 cm long, 2.5–4 cm broad, pinnate, pinnules usually deeply pinnatifid (at least at base) into 3–4 pairs of lobes, lobes obtuse to usually acutish, sometimes bifid; basal pinnules of lower pinnae often reduced about half; pinnules narrowed to short, green-winged stalk at the base, connected by a continuous narrow wing to adjacent pinnules; leaf tissue chartaceous, dark green, glabrous; sori to ca. 4 pairs on larger pinnules, elliptic, ca. 2–3 mm long, with large whitish thick convex indusia.

On the forest floor in Evergreen Cloud Forest, rarely Montane Rain Forest; common around higher peaks of Central Plateau, s Sierra Madre; 2000–2800 m. Southern Mex. (S.L.P., Ver., Méx., Sin., Jal., Gro., Pue., Oax.), Guat., Nic., C.R., Pan.; Hisp. Chiapas Collections: *G 219* (K, NY, P, PH); *G 369* (YU); *GM 115* (DS, US); *L&S 9880* (UC, US); *T 1973* (DS); *9297*; *21986*; *31812*; *31880*; *32037*; *33705*; *34698*.

Closely related to *A. achilleifolium,* which see for additional discussion. With one exception (*9297*), all Chiapas specimens of *A. commutatum* possess a terminal or subterminal bud(s). However, specimens from western Mexico often do not bear buds. If these budless forms prove to be a distinct taxon, the names *A. eatonii* and *A. subvestitum* are applicable. Some Chiapas specimens have very large, subglobose spores, suggesting that polyploidy or cytological abnormalities may occur in *A. commutatum.*

The description of *A. myapteron* Fée (Mém. Fam. Foug. 8:82. 1857) seems to apply to this species, but I have been unable to locate type material (*Schaffner 70, 294*) at either K or P. If the two prove to be the same, *A. myapteron* must be adopted because of priority.

9. **Asplenium conquisitum** Underw. & Maxon ex Christ, Bull. Herb. Boissier (2)7:270. 1907.

—Lectotype (chosen by Maxon, Contr. U.S. Natl. Herb. 10:488. 1908): Jamaica, *Maxon 1558* (P! isolectotype US). Additional syntypes are from Jamaica, Guatemala, Costa Rica.

For additional synonymy, see Morton & Lellinger (1966:36).

Illustrations: Hooker, Second Cent. Ferns pl. 34. 1860; Vareschi, Fl. Venez. 1(2):pl. 83, figs. 17–18. 1969 [as *A. perkinsii*].

Rhizome short-creeping to suberect, compact; fronds numerous, arching, mostly 20–35 cm long, with a flagelliform apex (to 8 cm long) that bears a bud at the tip; stipe atropurpureous, shining, glabrous, very short (usually less than 1.5 cm long), ca. 1–1.5 mm diam.; rachis similarly colored and shining; blade elliptic, essentially 3-pinnate, reduced on both sides of middle, lower pinnae diminished nearly to rhizome; pinnae mostly 18–25 (30) pairs, crowded and often overlapping, to 7 cm long, 1–1.8 cm wide; ultimate segments elliptic or spatulate, 2–4 mm long, ca. 1 mm wide, mostly acutish at tip; leaf tissue dark green, thin, glabrous; sori 1–2 mm long on ultimate segments.

Epiphytic, known from essentially two localities in Montane Rain Forest; very locally common in Northern Highlands (Jitotol Ridge) and se Central Plateau (e of Lago Tziscao); 1250–1700 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Col. to Sur.); Jam. Chiapas Collections: *G 382* (K, PH); *Gi 4222* (NY); *29807*; *32199*; *32675*; *35131*; *38934*.

It is possible that *Asplenium rutaceum* (Willd.) Mett., based on a Plumier illustration (Tract. Fil. Amer. pl. 57. 1705), is an earlier name for this species. This illustration, representing a plant from Hispaniola, lacks the lower portion of the blade as well as the flagelliform apex, and so the identity of *A. rutaceum* is uncertain. Also, I have been unable to locate any herbarium material of *A. conquisitum* from Hispaniola. Under these circumstances, it seems best not to apply the name *A. rutaceum* to Mexican or Central American specimens.

A possible hybrid involving this species is *Breedlove 22294* from Lagos de Monte Bello. Pinnae are reduced nearly to the rhizome and the dissection of the blade is much like *A. conquisitum,* but the apex is not flagelliform nor gemmiparous, and the stipes and rachises are rather dull. Spores and/or sporangia are completely abortive.

10. **Asplenium cristatum** Lam., Encycl. Méth. 2:310. 1786.

—Type: locality and collector not stated (P—JU 1276!).

Asplenium cicutarium Swartz, Prodr. Veg. Ind. Occ. 130. 1788. —Type: Jamaica, *Swartz s.n.* (S).

Illustrations: Small, Ferns SE States 172. 1938; Vareschi, Fl. Venez. 1(2):pl. 82, pt. 1969; Lowe, Ferns 5:pl. 20. 1858.

Rhizome suberect to erect; fronds several to numerous, (20) 30–55 (70) cm long, to 15 cm broad, lance-deltoid (lowest pinnae largest or nearly so) or with 1–4 (9) pairs of abruptly reduced pinnae at base, apex acuminate, not proliferous; stipe grayish brown to brown, not shining, ⅛ to nearly equaling blade length, 1–2 mm diam.; rachis similar in color to stipe, adaxially green-winged; blade 15–40 cm long, (6) 9–15 cm broad, deeply bipinnate-pinnatifid to essentially tripinnate; pinnae 15–20 pairs, horizontal, sessile, the largest mostly 1.5–2.5 cm broad; pinnules 9–14 pairs per pinna, basal superior one overlapping rachis; ultimate segments acute at tip; leaf tissue yellowish green to dark green, thin, glabrous; sori solitary on ultimate segments, mostly 1–3 mm long; $n = 36$ (Fla.), ca. 72 (Gal.).

Terrestrial or saxicolous, infrequently bases of trees, in Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; common in Northern and Eastern highlands, n Sierra Madre; 300–1600 (2100) m. Southern and e Mex. (Tam., S.L.P., Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Gui. and Peru, s Braz.); Fla., Antill., Trin. Chiapas Collections: *G 383* (PH); *GM s.n.* (DS); *21709*; *21754*; *21799*; *21814*; *21874*; *22464*; *24052*; *24918*; *24988*; *25396*; *27467*; *29081*; *29891*; *29934*; *31314*; *32549*; *33067*; *33077*; *33168*; *33886*; *34469*; *34884*; *38077*; *38164*; *39996*.

Chiapas specimens can be sorted into two more or less discrete types: those with and those without reduced basal pinnae. The latter occur at lower elevations in Chiapas (300–1200 m, Northern and Eastern highlands) and agree well with most material from the West Indies. Specimens with reduced pinnae are more numerous, occurring from 700–2100 m in the Northern Highlands and N Sierra Madre. I have seen nearly identical specimens from elsewhere in Mexico (especially Veracruz), Central America, and the Andes. The number of greatly reduced basal pinnae varies widely, and a few collections seem to show fronds both with and without reduced pinnae, e.g., *29081*. The problem is complicated by the existence of another species, *A. myriophyllum,* which in habit greatly resembles smaller specimens of *A. cristatum* with reduced pinnae. Another close relative is *A. munchii,* but that species possesses buds near the frond apex, the fronds are narrower and more deeply cut, and the reduced basal pinnae taper gradually. Close West Indies allies appear to be *A. sciadophilum* Proctor (Jamaica), with reduced basal pinnae but simple pinnules, and *A. ocoense* C. Chr. (Hispaniola), also with reduced basal pinnae. From Christensen's illustration and description, I am unable to distinguish the latter from Chiapas collections with reduced basal pinnae. The whole group is badly in need of monographic revision.

11. **Asplenium cuspidatum** Lam., Encycl. Méth. 2:310. 1786.

—Type: Peru, *Joseph de Jussieu s.n.* (P).

Asplenium fragrans Swartz, Prodr. Veg. Ind. Occ. 130. 1788. —*Asplenium auritum* Swartz var. *tripinnatum* Fourn., Mex. Pl. 1:107. 1872. —*Asplenium cuspidatum* var. *tripinnatum* (Fourn.) Morton & Lellinger, Mem. New York Bot. Gard. 15:29. 1966. —Type: Jamaica, *Swartz s.n.* (S).

Asplenium foeniculaceum H.B.K., Nov. Gen. & Sp. 1:15. 1815. —*Asplenium cuspidatum* var. *foeniculaceum* (H.B.K.) Morton & Lellinger, Mem. New York Bot. Gard. 15:29. 1966. —Type: "Novae Andalusiae" [Venezuela], *Humboldt & Bonpland* (P; isotypes B—Herb. Willd. 19860).

Asplenium lacerum Schlecht. & Cham., Linnaea 5:612. 1830. —Type: Mexico [Veracruz], prope Jalapa, *Schiede & Deppe s.n.* [775] (isotype P!).

Asplenium mexicanum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):62, pl. 15, fig. 4. 1842. —Type: Mexico, Veracruz, Xalapa and Mirador, *Galeotti 6391* (BR! photo UC!; isotypes BR!—2 sheets).

Asplenium coriifolium Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:249. 1849. —Type: Mexico, Oaxaca, Tepitongo and Totontepec, *Liebmann* [Liebm. Pl. Mex. 2270, Fl. Mex. 334, 335, and 336] (C! probable isotype K!). I choose Fl. Mex. 336 as lectotype.

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 25. 1909; Vareschi, Fl. Venez. 1(2):pl. 86, fig. 4. 1969; Hooker & Greville, Icon. Fil. 1:pl. 92. 1828.

Rhizome erect to suberect; fronds several, (6) 15–45 cm long; stipe brown to atropurpureous or sometimes greenish adaxially, not shining, ½–⅔ blade length; rachis brownish, green winged, not proliferous; blade ovate-deltoid, bipinnate-pinnatifid to quadripinnate, lowest pinnae usually the largest, gradually tapering distally to an acuminate apex; pinnae mostly 5–12 pairs, to 8 cm long, 3 cm broad, often with a long-acuminate apex, ascending; ultimate segments linear to obovate, sharply toothed at tip; veins 1–3 in ultimate segments; leaf tissue subcoriaceous, dark green to brownish green; sori 2–3 mm long, straight, with a thick whitish indusium; $n = 72$ (Jam., Oax.).

Epiphytic (infrequently on rocks or perhaps terrestrial), in Montane Rain Forest (infrequently Evergreen Cloud Forest or Lower Montane Rain Forest); very common in Northern and Eastern highlands, Sierra Madre, Central Plateau; 750–3000 m. Southern Mex. (Jal., Oax., Méx., Hgo., Ver.), Guat., Salv., Hond., Nic., C.R.; S.A. (Col. and Ven. to Bol.); Gr. Antill. Chiapas Collections: *GM s.n.* (DS); *GM 110* (DS); *Li 1534* (BR); *R 844* (MEXU, NY, PH); *G 403* (NY, PH); *EM 4666* (MEXU); *Dr 1627* (MEXU, US); *Dr 1665* (MEXU, US); *C&D 223* (US); *GM 122* (DS, US); *Z 387* (DS); *T&L 40377* (DS); *T&L 41634* (DS); *T&L 41098* (DS); *T&L 41651* (DS); *R&B 19815* (DS, US); *R&B 20020* (DS, US); *9412*, *15361*; *21136*; *22374*; *22750*; *23114*; *24919*; *25003*; *25004*; *25433*; *26776*; *26831*; *27245*; *28906*; *29672*; *29890*; *30079*; *30912*; *31326*; *31780*; *31887*; *31977*; *32203*; *32355*; *32485*; *32626*; *32946*; *33684*; *34568*; *34605*; *35259*; *38772*; *38913*; *40316*.

Extremely variable in dissection; less dissected plants tend toward *A. pyramidatum,* but in our region there is little likelihood of confusion between the two. For Chiapas I do not find it expedient to recognize the varieties of Morton and Lellinger (1966:28–29). Most specimens from our region would key to their varieties *tripinnatum* or *foeniculaceum,* but bipinnate-pinnatifid forms grade completely into quadripinnate forms.

12. **Asplenium delitescens** (Maxon) L. D. Gómez, Brenesia 8:52. Mar. 1976.

—*Diplazium delitescens* Maxon, Contr. U.S. Natl. Herb. 10:497, pl. 56, fig. 1. 1908. —Type: Cuba, Oriente, vicinity of San Luis, *Pollard & Palmer 348* (US).

Illustration: see original, of a single pinna.

Rhizome short-creeping, to ca. 6 cm long, 3 mm diam., with numerous persistent distichous stipe bases; fronds few, up to 50 cm long, with stipe half to nearly as long as blade, ca. 2–3 mm diam., stramineous to brownish; blade deltoid, to 22 cm broad, not viviparous, with 5–8 (11) pairs of lateral pinnae, uppermost 1–2 pairs abruptly reduced and giving rise to a subhastate, serrate, terminal segment to ca. 10 cm long; largest pinnae to 15 cm broad, mostly 1.5–2.5 cm wide, broadest near or below middle, inequilateral at base (truncate above, cuneate below), inner margin straight and nearly parallel to rachis, subauriculate, margins elsewhere curvescent-serrate; veins from costae mostly 3–4-forked, free, upcurved, not easily visible; sori borne on first anterior branch, diplazioid to mostly single; indusia to 2 cm long, ca. 0.5 cm wide, whitish, subentire.

Saxicolous or terrestrial in Tropical and Lower Montane rain forests; scattered in Northern and Eastern highlands, S Sierra Madre; 300–800 m. Southern Mex. (Ver., Oax., Tab.), Bel., Guat., Hond., Nic., Pan.; S.A. (Ven., Ecu.); Cuba. Chiapas Collections: *EM 221* (US); *Lu 17878* (US); *S 1692* (MEXU, US); *R 1095* (US, GH); *22482*; *29935*; *33123*; *33853*; *34140*; *38153*; *42843*.

Until recently, this species was treated as a *Diplazium,* but its relationship to *Asplenium* is closer [Smith, Amer. Fern J. 66:116–120. "1976" (Jan 1977)].

An apparent isotype of *Asplenium purpurascens* Mett. ex Kuhn (*Spruce 5697,* K!) is this species, but the locality as given on this specimen ("Ventanas prope Guayaquil") does not agree with that stated in the protologue ("ad pedem montis Chimborazzo"); in addition, the description of *A. purpurascens* describes that species as having subbipinnatisect fronds and shining purplish stipes, characters that are at variance with *A. delitescens*. If the two species prove to be the same, *A. purpurascens* has priority.

13. **Asplenium dentatum** L., Syst. Nat., ed. 10, 2:1323. 1759.

—Lectotype (chosen by Morton & Lellinger, 1966:25): Plumier, Tract. Fil. Amer. pl. 101C. 1705.

Illustrations: Small, Ferns SE States 159. 1938; Hooker & Greville, Icon. Fil. 1:pl. 72. 1828; Eaton, Ferns No. Amer. 2:pl. 80, figs. 1–3. 1880.

Rhizome erect; fronds numerous, subdimorphic, the sterile forming a rosette, spreading or prostrate, short (3–12 cm long), short-stipitate, the fertile central, erect, 10–25 cm long, long-stipitate, stipe nearly as long as blade; stipe greenish, narrowly alate; blade 1-pinnate, linear, usually with a subflabellate terminal segment, not proliferous; pinnae 6–13 pairs, horizontal or ascending, the lowermost petiolulate 1–2 mm, oblong to trapeziform (fertile subflabellate), not more than 15 mm long and 8 mm broad, cuneate and unequal at base, rounded or dentate at apex, subentire to serrate along upper side, entire on lower side; veins mostly simple to 1-forked; sori 2–4 (5) pairs; $2n = 108$ (Jam.).

Terrestrial or epipetric, in our region known only from the vicinity of Yaxchilán and along road to Mal Paso, on limestone ridges in Tropical and Lower Montane rain forests; uncommon in Northern and Eastern highlands; 300–800 m. Southern Mex. (Yuc.), Guat. (Petén); S.A. (Col., Ven.); Fla., Antill., Trin. Chiapas Collections: *29932*; *29939*; *33892*; *28185*; *42850*.

Proctor (Fl. L. Antill. 2:314. 1977) adopted the name *A. trichomanes-dentatum* L. (Sp. Pl. 2:1080. 1753) for this species, but Morton and Lellinger (1966) and others have rejected this name as being "confusing, not in binomial form, and probably due to an oversight on the part of Linnaeus."

14. **Asplenium exiguum** Beddome, Ferns So. India 49, pl. 146. 1863.

—Type: India, Nilgiris, *Beddome s.n.* (K!).

Athyrium gracile Fourn., Mex. Pl. 1:102. 1872. —Type: Mexico, "vallis Mexicensis pr. Pedregal," *Bourgeau 252* (P—3 sheets!).

Asplenium glenniei Baker, Syn. Fil., ed. 2, 488. 1874. —Syntypes: Mexico, *Glennie s.n.* (K!), *Bourgeau 252* (K! isosyntypes P—3 sheets!).

Illustrations: Knobloch & Correll, Ferns Chih. 150. 1962; Hooker's Icon. Pl. 17:pl. 1648. 1886.

Rhizome very short; fronds caespitose, arching or flattened against substrate, to 12 cm long; stipe to 1.5 cm long, 0.8 mm diam., castaneous; rachis green above, castaneous with maturity below; blade flagelliform or attenuate at apex, ending in a bud that may root and develop a new plant; pinnae to ca. 15 pairs, to 6 mm long, 3 mm wide, lowermost deeply incised, uppermost subentire, at the tip often emarginate and proliferous in the emargination; sori 1–4 pairs per pinna, on both sides of costa, ca. 1 mm long, slightly curved; indusia whitish green, erose, ca. 0.3 mm wide; $n = 72$ (India).

In Chiapas, known from a single collection, on rocks, with *Quercus*, *Cnidoscolus*; Central Depression near Guatemala border; 1000 m. Arizona, w Mex. (Chih., Coah., Son., Dgo., S.L.P., Gro., Oax.); n India, s China. Chiapas Collection: *26979*.

The description is drawn from the sole Chiapas collection. Other Mexican collections are not so prominently flagelliform or lack a flagelliform apex entirely; collections from Asia frequently bear a flagelliform apex.

15. **Asplenium falcinellum** Maxon, Contr. U.S. Natl. Herb. 13:14. 1909.

—Type: Guatemala, Alta Verapaz, Cubilquitz, *Tuerckheim II 1910* (US).

Illustration: **Fig. 9.**

Rhizome suberect, with rhizome scales under 5 mm long; fronds fasciculate, arching, to 75 cm long; stipe brownish, 15–30 cm long, 3–4 mm diam., not winged; blade 1-pinnate, with a conform terminal pinna, not proliferous; rachis tan to stramineous, not winged; pinnae 7–12 pairs, lance-falcate, 10–17 cm long, 1.5–2 (3) cm broad, long-attenuate, subequally cuneate at base, petiolulate 2–4 mm, entire; sori medial, 8–15 (22) mm long; leaf tissue chartaceous to subcoriaceous, drying yellowish green, glabrous; veins mostly 3-forked; sori medial, 10–15 (22) mm long.

Epiphytic in Lower Montane and Montane rain forests; uncommon in Northern and Eastern highlands; 600–800 m. Guatemala, Bel., Nic., C.R., Pan.; S.A. (Col.). Chiapas Collections: *R s.n.* (MO, not seen, paratype cited by Maxon); *R 1044* (PH); *32947*.

Breedlove 33375, near Laguna Miramar, is perhaps this species, but the fronds are very small (20 cm long) and the pinnae are shallowly crenate.

16. **Asplenium feei** Kunze ex Fée, Gen. Fil. 194. 1852.

—Type: Mexico, *Galeotti s.n.* (P!).

Asplenium sanguinolentum Kunze ex Mett., Abh. Senckenberg. Naturf. Ges. 3:142, pl. 4, fig. 10. 1859. —Lectotype (chosen by Morton & Lellinger, 1966:10): Brazil, *Beyrich s.n.* (L).

For additional synonymy, see Morton & Lellinger (1966: 10).

Illustrations: Fée, Mém. Fam. Foug. 7:pl. 15, fig. 2. 1857; Maxon, Contr. U.S. Natl. Herb. 10:494, pl. 56, fig. 3. 1908 [as *Asplenium sarcodes* Maxon]; Vareschi, Fl. Venez. 1(2):pl. 87, figs. 1–2. 1969.

Rhizome short-creeping to suberect, densely scaly at apex; fronds 20–90 cm long; stipe ca. 0.5 times as long as blade, brownish, fibrillose-scaly at the base; blade 1-pinnate, not reduced basally, with a subconform terminal pinna, not proliferous; rachis green to brown, narrowly or not at all winged; pinnae 6–14 pairs, petiolulate 1–2 (3) mm, 4–10 cm long, 9–20 mm broad, acute or attenuate, unequally cuneate at base, excised on lower side, rounded or somewhat auriculate on superior side, entire to crenate-serrate or biserrate; veins 1–2-forked; leaf tissue glabrous, often drying dark green or blackish, chartaceous; sori elliptic, mostly 3–5 mm long, 1–2 mm broad, slightly sunken; indusia broad, whitish, membranous, 1–2 mm broad, vaulted over the sporangia.

Terrestrial, in Montane Rain Forests; uncommon in Eastern Highlands, lower elevations of s Sierra Madre; 800 m. Guatemala, Nic., C.R., Pan.; S.A. (Col. to Bol., s Braz.); Gr. Antill. Chiapas Collections: *P 6765* (UC, part; US); *P 7110* (UC); *P 7242* (UC, US); *33116*.

17a. **Asplenium flabellulatum** var. **flabellulatum**

—*Asplenium flabellulatum* Kunze, Linnaea 9:71. 1834. —*Asplenium flabellulatum* var. *dentatum* Klotzsch, Linnaea 20:357. 1847. —*Asplenium radicans* L. var. *dentatum* (Klotzsch) Bonap., Notes Pterid. 7:349. 1918. —Lectotype (chosen by Morton & Lellinger, 1966:37): Peru,

Pampayaco, *Poeppig 1145* (B; isolectotype W, photo BM!).
Illustrations: Ettingshausen, Farnkr. pls. 84, 88. "1865" [1864]; Hieronymus, Hedwigia 47:pl. 3, fig. 12. 1908.

Rhizome erect; fronds arching, mostly 50–75 cm long; stipe atropurpureous, shining, 2–3 mm diam., ca. ⅓–½ blade length; blade deltoid-lanceolate, with a flagelliform tip that ultimately bears a bud; pinnae to ca. 30 pairs, the largest also with a minute bud at tip, 9–15 cm long, 2–3 cm wide, with up to 20 pairs of free pinnules; pinnules cuneate or petiolulate at base, larger ones with at least the basal acroscopic segment free (fronds thus tripinnate), otherwise deeply incised to dentate on margin; leaf tissue dark green, chartaceous, relatively thin; sori on ultimate segments, 2–3 mm long.

Terrestrial in Montane Rain Forest and Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands, Sierra Madre; 1600–2000 m. Range uncertain, but at least Guat., Nic., C.R.; S.A. (Col. and Ven. to Peru); Cuba, Jam., Hisp. Chiapas Collections: *P 312* (US); *P 353* (US); *P 10535* (UC); *15409*; *31313*; *31988*.

This species is often treated as a variety of the polymorphic *A. radicans* (see, e.g., Morton & Lellinger, 1966:37), a rather unsatisfying treatment since *A. radicans* s.l. includes forms ranging from simply pinnate to three or more times pinnate. In Chiapas, *flabellulatum* has been found growing with *A. radicans* s.s. on Cerro Baul, but intermediates were not found.

17b. Asplenium flabellulatum var. **partitum** Klotzsch, Linnaea 20:357. 1847.

—*Asplenium radicans* L. var. *partitum* (Klotzsch) Hieron., Bot. Jahrb. Syst. 34:464. 1904. —Lectotype (chosen by Morton & Lellinger, 1966:37): Venezuela, Caracas, *Otto 651* (B).
Illustration: none found.

Differing from var. *flabellulatum* in the blade being bipinnate, the pinnules merely sharply dentate; buds not seen at tips of pinnae.

In the same vegetational formations as var. *flabellulatum*; uncommon in n Sierra Madre; 1600 m. Range uncertain, but at least s Mex. (Ver., Oax.), Nic., C.R., Pan.; S.A. (Col., Ven.); Cuba, Jam. Chiapas Collections: *G 423* (K, YU); *21809*; *21815*; *25476*.

Varieties *partitum* and *flabellulatum* seem to intergrade and may only represent growth stages of one taxon. I believe that they are much more closely related to each other than to *A. radicans* s.s. or *A. cirrhatum*, with which they have usually been combined.

18. Asplenium formosum Willd., L. Sp. Pl., ed. 4, 5:329. 1810.

—Type: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19908).
Asplenium subalatum Hook. & Arn., Bot. Beechey Voy. 312, pl. 71. 1838. —Type: Mexico, Tepic, *Lay s.n.* [*Beechey*] (K!).
Illustrations: Vareschi, Fl. Venez. 1(2):pl. 82, pt. 1969; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 14, figs. 9–10. 1897; Lowe, Ferns 5:pl. 43. 1858.

Rhizome short, ± erect; fronds numerous, fasciculate, 6–20 (40) cm long, (1.3) 2–3.5 cm broad, not proliferous; stipe much shorter than blade, mostly shorter than 5 cm, atropurpureous, shining; blade 1-pinnate, linear, gradually narrowed at base, rachis atropurpureous and shining; pinnae 25–50 pairs, sessile, oblong, 7–18 mm long, 3–6 mm broad, unequal at base, dimidiate, lower base excised and entire, superior margin serrately incised, many teeth minutely bifid; veins simple; leaf tissue herbaceous to chartaceous, dark green; sori usually 1–3 per pinna, ± parallel to lower margin; indusia large, whitish; *n* = 36 (Jam., India).

On rocks and along streams, dry ravines, terrestrial or epipetric, in Seasonal Evergreen Forest, Tropical and Montane rain forests, and coffee-cacao plantations; locally common in Pacific and Gulf coastal plains, Northern Highlands, Central Depression, Sierra Madre; 150–900 (1200) m. Southern and w Mex. (Nay., Jal., Gro., Mich., Mlos., Ver., Oax.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. to Guy. and n Arg., s Braz., Parag.); Antill. Chiapas Collections: *RMK 2781* (UC, US); *GM 190* (DS, US); *R 836* (NY, PH); *G 390* (K, PH); *EM 18386* (DS, MEXU, US); *21898*; *25612*; *29927*; *30706*; *31583*; *33380*; *35046*; *37685*; *38484*; *40167*; *42425*.

19. Asplenium fournieri Kuhn ex Fourn., Bull. Soc. Bot. France 17:237. 1870.

—Type: Nicaragua, Omotépé, *Lévy 1159* (P—2 sheets! photo UC!).
Illustration: **Fig. 11.**

Rhizome small, compact, suberect; fronds delicate, few, mostly shorter than 12 cm; blade 6 cm broad, deltoid, tripinnate-pinnatifid; stipe mostly darkened toward base, ca. ½ blade length, less than 0.5 mm diam.; pinnae 5 or fewer pairs; ultimate segments linear or narrowly obovate and toothed at tip; leaf tissue light to dark green, very thin, glabrous; sori ca. 1 mm long.

On rocks (also terrestrial ?) in Tropical Deciduous Forest, Seasonal Evergreen Forest; rare in Central Depression; 850–900 m. Western Mex. (Sin., Oax.), Guat., Hond., Nic.; S.A. (Col.). Chiapas Collections: *37593*; *40009*.

This species has often been confused with *A. cuspidatum*, but it grows in an entirely different habitat at generally much lower elevation. The blade texture is very thin in contrast to the rather succulent leaves of *A. cuspidatum*.

20. Asplenium harpeodes Kunze, Linnaea 18:329. "1844" [1845].

—Lectotype (chosen by Morton & Lellinger, 1966:15): Mexico, *Leibold 26* (B; isolectotype P!).
Asplenium donnell-smithii Christ, Bot. Gaz. (Crawfordsville) 20:544. 1895. —Type: Guatemala, Dept. Quiché, *Heyde & Lux s.n.* [ed. Donn.-Smith 4678] (presumably P).
Illustration: Vareschi, Fl. Venez. 1(2):pl. 83, fig. 2. 1969.

Rhizome short, suberect, densely and conspicuously scaly at apex, the scales long-attenuate to filiform at apex, dark reddish brown; fronds numerous, arching or pendent, (25) 40–80 (100) cm long; blade mostly 3–12 cm broad, with usually 1–2 pairs of somewhat reduced pinnae at base; stipe atropurpureous, dull, $^{1}/_{10}$–¼ as long as blade, 1–2 mm diam.; rachis brownish to atropurpureous, adaxially narrowly green-winged, not proliferous; pinnae lanceolate, falcate, ca. 6–12 mm wide, long-acuminate and ascending at apex, cuneate or excised at lower base, superior base sometimes overlapping rachis, the margin strongly crenate-serrate; veins all simple except superior basal ones; leaf tissue dark green, thin, glabrous; sori numerous, 2–3 mm long, inframedial.

Epiphytic in Montane Rain Forest, Evergreen Cloud Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, n Sierra Madre; (1250) 1700–2800 m. Southern Mex. (Ver., Oax.), Guat., Salv., Nic., C.R., Pan.; S.A. (Col. to

Guy. and Bol., s Braz.); Jam., Hisp. Chiapas Collections: *G 391* (K, NY); *EM 2945* (K, MEXU); *T&L 41453* (DS); *GM 105* (DS, P, US): *15203*; *21454*; *21984*; *23107*; *23234*; *23235*; *32180*; *32422*; *32605*; *33603*; *33699*; *34444*; *38939*.

The two collections of *A. harpeodes* from the southeastern corner of the Central Plateau (*32180*; *38939*) are not typical and seem to vary in the direction of *A. pteropus,* which has been found in Chiapas at lower elevations than has *A. harpeodes*. This group is in need of monographic revision.

21. **Asplenium harrisii** Jenm., Gard. Chron. (3) 17:68. 1896.

—Type: Jamaica, Blue Mountain Peak, *Harris s.n.* [*7474*] (K!).
Illustration: none found.

Rhizome small, compact, bearing lanceolate scales at apex; fronds arching, to ca. 15 cm long; blade 1.5 cm broad, usually with a flagelliform apex that eventually bears a small bud; stipe very short, mostly shorter than 1.5 cm, 0.5 mm diam. or less, greenish tan, not shining; rachis greenish, adaxially narrowly green-winged; pinnae mostly 15–30 pairs, lowermost 3–6 pairs gradually reduced nearly to rhizome, medial pinnae oblong, lower side cuneate and straight, superior base truncate, upper margin erose to subentire, rounded at apex, petiolulate to 0.5 mm; veins simple, ca. 3 pairs; leaf tissue greenish, thin, glabrous; sori 1–2 pairs per pinna, on both sides of costa, ca. 1.5 mm long; $n = 72$ (Jam.).

On rocks or in rock crevices in Evergreen Cloud Forest; rare in s Sierra Madre; 2800 m. Elsewhere known only from Jamaica, at the summit of Blue Mountain Peak. Chiapas Collection: *31750*.

The sole Chiapas collection differs slightly from the few Jamaican specimens that I have seen, but its relationship is certainly with this species, and it can be placed here tentatively. The apices of at least some of the fronds on the Chiapas gathering are flagelliform, but I have not seen buds, as in Jamaican material.

22. **Asplenium heterochroum** Kunze, Linnaea 9:67. 1834.

—Type: Cuba, *Poeppig s.n.* (isotype BM!).
Illustrations: Maxon (1913:141); Small, Ferns SE States 187. 1938.

Rhizome small, compact; fronds numerous, arching, (5) 8–35 cm long; stipe very short, 1–4 cm long, 0.5–1.0 mm wide, blackish; blade 1–1.8 cm broad, linear, lower several pairs of pinnae reduced nearly to rhizome, dwindling slightly at tip to a confluent, sometimes ligulate terminal segment; pinnae 15–45 pairs, oblong, the largest 2–4 mm wide, serrulate to crenate-dentate along upper margin and tip, sometimes with a basal acroscopic auricle; veins mostly simple; leaf tissue dark green, chartaceous, relatively thin; sori (1) 2–5 pairs per pinna, on both sides of costa; $n = 72$, 108 (Fla.).

On limestone rocks, sometimes terrestrial, in Tropical and Montane rain forests; uncommon in Eastern Highlands, se Central Plateau; 200–1400 m. Belize; Fla., Berm., Cuba, P.R. Chiapas Collections: *S 1713* (MEXU, US); *22379-B*; *32911*; *33216*.

Closely related to *A. palmeri,* differing from that species in the nonflagelliform apex and lack of a terminal bud, thinner leaf texture, and segments more noticeably incised. From *A. resiliens,* also a close relative, it differs in the thinner leaf texture and segments not strongly deflexed. *Asplenium heterochroum* grows at lower elevations than either of these two species and in different vegetational associations.

23. **Asplenium hoffmannii** Hieron., Hedwigia 60:258. 1918.

—Type: Costa Rica, Aguacate, *Hoffmann 836* (B, photo BM!).
Asplenium membranifolium Maxon, Amer. Fern J. 24:72. 1934. —Type: Panama, ca. 10 mi. e of Panama City, *E. P. Killip 2567*(US).
Illustration: **Fig. 9.**

Rhizome short-creeping, 1.5–3 mm diam., with subulate scales 2–3 mm long; fronds 2–3 per plant, 10–25 cm long, with stipe usually much shorter than blade (⅓–½); stipe 0.5–1 mm diam., greenish or, less frequently, brownish with green margins; blade 8–16 cm long; 3–6 (8) cm broad, pinnate in lower half, basal 1–2 pairs of pinnae slightly shortened, upper segments semiadnate and decurrent, uppermost broadly joined below the lobed or coarsely crenate attenuate apex; pinnae mostly 5–9 pairs, principal ones opposite, broadly excavate at proximal base, thus inequilateral, ± trapeziform-oblong, usually obtuse at apex, singly or doubly crenate-serrate along margin, usually without auricular lobes; veins 7–8 (10) pairs, all except the basal 1-forked or simple; leaf tissue delicately membranous, fragile, light green, glabrous; sori 3–8 (10) pairs, 2–5 mm long, nearly straight, single or infrequently diplazioid, with a pale subentire indusium.

In our region, known only from limestone rocks in Tropical Rain Forest; lower elevations of the Eastern Highlands, banks of the Río Usumacinta at Yaxchilán; 300 m. Elsewhere, known from Oax., Guat., Nic., C.R., Pan.; S.A. (Col.). Chiapas Collections: *29938*; *33869*; *33893*; *42851*.

This species is a near ally of *A. laetum,* which also occurs at lower elevations. *Asplenium hoffmannii* differs in having a mostly greenish rachis, lighter green fronds, thinner leaf texture, lower side of pinnae not so straight, pinnae obtuse at apex.

24. **Asplenium insolitum** A. R. Smith, Amer. Fern J. 70:15, figs. 1–2. 1980.

—Type: Mexico, Chiapas, Munic. Motozintla de Mendoza, Cerro Mozotal, *Breedlove 41653* (DS).
Illustration: only the original.

Rhizome suberect, caudex ca. 1 cm diam.; fronds 35–45 cm long, with stipe equaling or nearly equaling blade length; stipe brown to gray-brown, dull, ca. 1.5 mm diam., adaxially green-winged, glabrous, with a few dark brown, ovate scales at base, these ca. 2 mm long, obscurely clathrate, with thick walls and crowded, very small lumina; blade ovate-lanceolate, 18–25 cm long, bipinnate, attenuate at apex but not flagelliform or proliferous; rachis green-winged adaxially, brownish abaxially, epaleate; pinnae 15–20 pairs, to 6 cm long, 2.5 cm broad, sessile or nearly so, lowermost 1 (2) pair somewhat reduced, often deflexed; pinnules up to 8 pairs per pinna, often with an acroscopic lobe, otherwise dentate or bidentate along margin, cuneate at base, usually inequilateral with lower side excised; leaf tissue and axes below glabrous or with minute (0.1 mm long) appressed capitate hairs; venation pinnate, with up to 4 pairs of lateral veins per pinnule; sori 1.0–2.5 mm long, with a thin whitish indusium.

Terrestrial or epiphytic in steep canyons, Montane Rain Forest; rare in s Sierra Madre; 2100 m. Known only from the type and a topotype: *25760*.

25. **Asplenium juglandifolium** Lam., Encycl. Méth. 2:307. 1786.

—Syntypes: "Antilles," collector not stated (P—JU 1283A! and P—JU 1283B!; photo UC!).

Asplenium integerrimum Spreng., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 10:231. 1821. — Type: Puerto Rico, *Bertero s.n.* (B; isotype L).

Illustration: Hooker & Greville, Icon. Fil. 2:pl. 136. 1829.

Rhizome short-creeping to suberect, conspicuously scaly at apex, the scales more than 5 mm long, filiform, unicostate; fronds few (2–4), 35–90 cm long, imparipinnate; stipe ½–⅔ as long as blade, tan, dull, ca. 2–3 mm diam.; blade 1-pinnate; rachis tan to greenish, flattened but not winged; pinnae 2–8 pairs, ± equal, linear-lanceolate, 2–3 cm broad, broadly cuneate at base, attenuate at apex, usually entire along margin; veins mostly 2-forked; leaf tissue yellowish green, chartaceous, glabrous; sori to 15 mm long, straight, 7–13 pairs per pinna.

Epiphytic; rare in s Sierra Madre (Finca Irlanda); lower elevations. Nicaragua; S.A. (Sur., Ven., Peru, s Braz.); Cuba, Hisp., P.R. Chiapas Collection: *P 7249* (BM, NY, UC, US).

26. **Asplenium laetum** Swartz, Syn. Fil. 79, 271. 1806.

—Type: "India occidentali," presumably *Swartz* (presumably S).

Asplenium lugubre Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd.(5)1:243. 1849. —Type: Mexico, Veracruz, "Baranca de Mirador" [specimen], *Liebmann* [Liebm. Pl. Mex. 2272, Fl. Mex. 321 and 322] (C! Isotype K!). I choose Fl. Mex. 322 as lectotype.

Illustrations: Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 15, fig. 4. 1897; Hooker, Sp. Fil. 3:pl. 173. 1860.

Rhizome short-creeping; fronds few, 20–35 (50) cm long, stipe brown to atropurpureous, dull or shining, ½–⅔ as long as blade; blade 4–8 cm broad, 1-pinnate, apex confluent, acuminate or attenuate, pinnatifid, not proliferous; rachis brownish to purplish, not or obscurely alate; pinnae 11–20 (28) pairs, lowermost 1–2 pairs sometimes reduced, horizontal or often ascending, subsessile, trapeziform-oblong, 2–7 cm long, 6–13 (20) mm broad, obtuse to acutish, petiolulate 1–3 mm, dimidiate, the lower base excised or straight for ca. ½ pinna length, the upper margin crenate-serrate to subentire; veins mostly forked; leaf tissue chartaceous; sori up to ca. 12 pairs per pinna, mostly 3–10 cm long, straight or the longest slightly curved; $n = 36$ (Jam.).

Terrestrial in Tropical and Lower Montane rain forests, rarely Seasonal Evergreen Forest; scattered in Northern and Eastern Highlands, Pacific Coastal Plain; 200–1000 m. Southern Mex. (Oax., Ver., Tab.), Bel., Nic., C.R., Pan.; S.A. (Col. to Ven. and Bol., s Braz.); Antill., Trin. Chiapas Collections: *G 426* (K, YU); *P 6765*, pt. (NY, UC); *P 6735* (NY, UC, US); *P 7241* (UC, US); *21683*; *22505*; *22506*; *22507*; *30711*; *31494*; *32857*; *34197*; *34971*; *35323*.

27. **Asplenium lamprocaulon** Fée, Gen. Fil. 197. 1852.

—Type: Mexico, Oaxaca, Llano Verde, *Galeotti 6340* (P! photo UC!).

Asplenium nigricans D. C. Eaton, Proc. Amer. Acad. Arts 8:619. 1873 (not Kunze, 1834). —*Asplenium melanorachis* C. Chr., Ind. Fil. 121. 1905. —Type: Mexico, Chiapas, *Ghiesbreght 377* (YU! photo BM!; isotype K!).

Illustration: **Fig. 10.**

Rhizome short-creeping to suberect, compact; fronds relatively few (3–5), ca. 30–40 cm long, with stipe to 15 cm long, 1–1.5 mm broad, atropurpureous to ebeneous, shining; blade subabruptly terminated by a narrow-triangular acuminate serrate segment 2–4 cm long, ca. 1 cm broad; pinnae 12–20 pairs, the lowermost deltoid and slightly shortened, middle ones oblong-trapeziform, (1.5) 2–3 cm long, to 1 cm broad, obtuse at tip, crenate-denticulate along margin; leaf tissue dark green, chartaceous to subcoriaceous, glabrous; sori large, mostly 3–7 mm long, 1–4 pairs per pinna, on both sides of costa, or confined mostly to lower side, straight or slightly curved; indusia whitish, entire, to 1 mm broad.

Terrestrial or epiphytic on trunks of large trees, in Montane Rain Forest; uncommon in Northern Highlands, n Sierra Madre; 1600–2100 m. Otherwise known only from Oax. Chiapas Collections: *G 377* (YU); *Li s.n.* (P, photo UC); *31441*; *32757*; *34451*.

Characterized by the relatively small number of large pinnae. This species connects *A. monanthes* with the very large-segmented *A. obesum* Baker.

28. **Asplenium miradorense** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:243. 1849.

—Type: Mexico, Veracruz, near Mirador, *Liebmann* [Liebm. Pl. Mex. 2275, Fl. Mex. 323 and 324] (C!; isotypes BM! K!). I choose Fl. Mex. 323 as lectotype.

Asplenium bradeorum Hieron., Hedwigia 60:217. 1918. — Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:706. 1977): Costa Rica, Tablazo, *A. and A. C. Brade s.n.* [Rosenst. exs. 11] (B, photo BM!; isolectotype UC! fragm. US).

Asplenium diplosceuum Hieron., Hedwigia 60:232. 1918. —Type: Cuba, "Im ostlichen Teile der Insel," *Wright 849* (B; isotype BM!).

Asplenium schlechtendahlianum Hieron., Hedwigia 60:218. 1919. —Type: Mexico [Veracruz], "bei Jalapa," *Schiede 772* (B; photo BM!).

?*Asplenium standleyi* Maxon, Proc. Biol. Soc. Wash. 43:85. 1930. —Type: El Salvador, Dept. Ahuachapán, Finca Colima, *Standley 20136* (US).

Illustration: **Fig. 10.**

Rhizome erect, with inconspicuous dark brown lanceolate scales that are acute at tip; fronds numerous, 25–45 (55) cm long, with (0) 1–4 pairs of slightly reduced basal pinnae; stipe brown or grayish brown, dull, 1–2 (3) mm diam., not alate to marginate to very inconspicuously alate, $^{1}/_{6}$–$^{1}/_{3}$ length of blade; rachis usually not proliferous, rarely with a terminal or subterminal bud; pinnae 20–30 (40) pairs, inequilaterally lanceolate, 2–4 (7) cm long, obtuse to acute (but not attenuate) at tip, lower base cuneate or excised, superior base truncate, margins deeply crenate-serrate; veins simple or 1-forked; leaf tissue dark green to yellowish green, glabrous, chartaceous; sori 2–7 mm long, medial.

Terrestrial in Montane and Lower Montane rain forests, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; common in Northern Highlands and n Sierra Madre, uncommon in s Sierra Madre and se Central Plateau; 700–1600 (2200) m. Southern Mex. (S.L.P., Ver., Pue., Oax.), Nic., C.R., Pan.; probably S.A.; Cuba, Hisp., Jam. Chiapas Collections: *G 435* (K, YU); *21003*; *21609*; *21752*; *21794*; *21801*; *21802*; *22342*; *22504*; *24714*; *24823*; *24987*; *31317*; *31327*; *31515*; *31982*; *32504*; *42513*; *42652*.

Three collections from the Sierra Madre (*21801*, *42513*, *42652*) have terminal or subterminal buds; I have not seen buds on specimens of *A. miradorense* from other parts of the range. Two of these collections (*42513, 42652*) grow at unusually high elevations for the species.

Type material of *A. miradorense* is very small, fronds about 15 cm long, 2 cm broad. In Chiapas, fronds of this small size were collected by *Ghiesbreght, 435*. Since species of *Asplenium* are notorious for their capacity to produce precociously fertile fronds, I believe this size difference is not significant.

Asplenium miradorense has often been confused with *A. harpeodes*, also in Chiapas, but the latter is apparently always epiphytic, while *A. miradorense* is strictly terrestrial. Also, *A. miradorense* lacks long-attenuate pinna apices usually found in *A. harpeodes*. Elevationally, the two appear not to overlap, or to overlap only infrequently.

Other species more closely related to *A. miradorense* are *A. claussenii* Hieron. (Antill., Ven., s Braz.), *A. argentinum* Hieron. (NW Arg.), *A. otites* Link, *A. bangii* Hieron. (Peru, Bol.), *A. boliviense* Rosenst., *A. pulchellum* Raddi, *A. brasiliense* Raddi, and *A. potosinum* Hieron. (type from San Luis Potosí). The last named has pinnae with a single, nearly free, basal acroscopic lobe and is transitional to the yet more dissected *A. sessilifolium* and *A. munchii*. This whole group, including *A. miradorense*, is badly in need of monographic revision.

29. **Asplenium monanthes** L., Mantissa Pl. 130. 1767.

—*Asplenium monanthemum* L., Syst. Veg., ed. 14: 933. 1784 (nom. illeg.). —TYPE: South Africa, Cape of Good Hope (LINN 1250.17).

Asplenium arcuatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:241. 1849. —TYPE: Mexico, Veracruz, Mirador and Zacuapan, *Liebmann* [Liebm. Pl. Mex. 2257, Fl. Mex. 296] (C! probable isotype K!).

Asplenium galeottii Fée, Mém. Fam. Foug. 7:50, pl. 16, fig. 2. 1857 (nom. nud. in Gen. Fil. 192. 1852). —TYPE: Mexico, "prope Oaxaca," *Galeotti 6369* (presumably P; isotype BR, photo BM!).

Asplenium leptophyllum Fée, Mém. Fam. Foug. 7:50, pl. 14, fig. 2. 1857. —SYNTYPES: Colombia, prov. Ocaña, *Schlim 328, 479*; Mexico, *Galeotti 6446* (presumably P).

ILLUSTRATIONS: Plumier, Tract. Fil. Amer. pl. 65. 1705; also those cited under synonyms above.

Rhizome erect; fronds numerous, to 70 cm long, 4 cm wide; stipe castaneous or atropurpureous, shining, adaxially flattened with minute brown wings, to 30 cm long, 1–1.5 mm diam.; blade simply pinnate, linear, with up to 60 pairs of pinnae, the proximal pinnae deltoid, gradually reduced to ca. ⅓ as long as medial ones, distal pinnae evenly reduced to an acuminate, confluent apex, not proliferous (rarely proliferous at base of blade); medial pinnae horizontal or falcate, quadrangular, dimidiate, basiscopic edge entire, straight or cut away in a shallow curve, acroscopic edge subauriculate, entire to crenulate to dentate; leaf tissue chartaceous; sori inframarginal and ± parallel to lower edge, 1–3 (4) per pinna, infrequently 1–3 sori also on distal side of costa; $n = 72$ (Chis.); $n = 2n = 108$, apog. (Madeira, Tristan da Cunha, Oax., Ver.).

Rocky wooded slopes or in somewhat exposed places, Pine-Oak Forest, Montane Rain Forest, Evergreen Cloud Forest; very common in Sierra Madre, Northern Highlands (Jitotol Ridge), Central Plateau; 1250–3000 m. Southern Ariz., nearly throughout Mex. (Chih., Dgo., Nay., Cma., Jal., Gro., Mich., Oax., Mlos., Pue., Méx., D.F., Ver.), Guat., Salv., C.R.; S.A. (Col. to Ven. and N Arg., Urug., and Chile); Jam., Hisp.; Afr.; Haw. CHIAPAS COLLECTIONS: *L 160* (DS, NY); *T 1972* (DS, UC); *GM 64* (DS); *MC 1572* (US); *MC 1609* (US); *RMK 2798* (NY, UC, US); *A 1391* (NY, UC); *R 967* (PH); *L&S 9859* (US); *Li 1554* (K); *C&D 199* (US); *C&D 138* (US); *C&D 140* (US); *G 243* (K, NY, PH); *G 245* (K, NY, PH); *G 289* (K, NY); *EM 4704* (MEXU); *EM 5393* (MEXU, US); *EM 2877* (MEXU); *T 1992* (DS); *9332*; *9360*; *13777*; *15123*; *22001*; *22078*; *22079*; *22399*; *22655*; *22763*, pt.; *23013*; *23181*; *25042*; *26268*; *26849*; *27246*; *29272*; *29295*; *30129A*; *31440*; *31557*; *31740*; *31818A*; *31855*; *32033*; *32071*; *32319*; *33624*; *33696*; *34683*; *42772*.

An extremely variable and wide-ranging species. Small or depauperate forms are sometimes difficult to distinguish from *A. resiliens*. Large forms are similar to *A. polyphyllum*, but that species has small buds toward blade apex and sori on both sides of costa; *Asplenium monanthes* nearly always lacks buds (if present, then at blade base, e.g., *Breedlove 22001, 26849*).

30. **Asplenium monodon** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:247. 1849.

—*Asplenium auritum* Swartz var. *monodon* (Liebm.) Fourn., Mex. Pl. 1:106. 1872. —TYPE: Mexico, Veracruz, Hacienda de Jovo, *Liebmann* [Liebm. Pl. Mex. 2295, Fl. Mex. 302, 304] (C!; isotypes K! US). I choose Fl. Mex. 302 as lectotype.

ILLUSTRATIONS: Small, Ferns SE States 161. 1938 [as *A. auritum*]; Mettenius, Fil. Hort. Bot. Lips. pl. 8, figs. 3–6. 1856 [as *A. auritum* var. *obtusum* Kunze ex Mett.].

Rhizome erect; fronds to 50 cm long, 4–10 cm wide; stipe mostly ½–⅔ blade length, blackish abaxially, greenish to blackish adaxially, 1–2 mm diam.; blade linear-lanceolate, tapering gradually to an acuminate confluent apex; pinnae subhorizontal, sessile to stalked 1–2 mm, mostly 15–30 pairs, acute to obtuse at apex, a superior basal auricle cut nearly to costa, this denticulate at tip; pinna margins crenate-serrate to shallowly incised ⅓ distance to costa; spores globose, large, dark brown to blackish, 32 per sporangium; $n = 72$ (Fla.), 288 I at meiosis, apog. (Jam.).

Epiphytic in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; scattered in Northern Highlands, NE margin of Central Plateau; 300–900 m. Range uncertain, but at least s Mex. (Pue., Ver., Oax.), Guat., Fla., Cuba, Jam., Hisp., Martinique. CHIAPAS COLLECTIONS: *22149*; *22263*; *23358*; *24247*; *27461*; *35387*.

Closely related to *A. auritum*, under which the differences are discussed.

Quite a few plants identified in herbaria as *A. auritum* var. *obtusum* Kunze ex Mett. and *A. macilentum* Klotzsch ex Kunze greatly resemble *A. monodon*. An isosyntype of *A. macilentum* in UC (*Moritz 183*, Venezuela) has large globose spores and should probably be referred here. Another isosyntype (*Schomburgk 1168*, UC) has small reniform spores, and I agree with Morton and Lellinger (1966) that it is referable to *A. auritum* s.s. I have not seen the lectotype of *A. macilentum* designated by Morton and Lellinger (1966).

31. **Asplenium munchii** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:211, fig. 7, A–B. 1975.

—Type: Mexico, Chiapas, San Pablo, *Münch 114* (DS!).
Illustration: only the original, p. 228.

Rhizome suberect, hidden by stipe bases, caudex to 1.3 cm diam.; fronds numerous, caespitose, stipe 4–9 cm long, ca. 1 mm diam., brownish or brownish gray, not shining, glabrous; blade 3-pinnatifid, (17) 25–30 cm long, (3.5) 5–7 cm wide, attenuate and often proliferous towards apex; pinnae up to ca. 25 pairs, mostly alternate, sessile, longest in middle, 4 cm long, 1.5 cm wide, gradually reduced upwards and downwards (lowermost deflexed), inequilateral, acroscopic pinnules larger; pinnules at an angle of 45–60° to costa, the largest deeply 5-lobed; ultimate segments ca. 1 mm wide, rounded or acutish at apex; leaf tissue membranaceous, glabrous; sori along veins of ultimate segments, to 3 mm long, indusia 0.6 mm wide, these entire, tan.

Terrestrial, in Montane Rain Forest, Evergreen Cloud Forest; scattered in Central Plateau, Northern Highlands (Jitotol Ridge); 1300–2300 m. Thus far known only from Chis., Oax., Jal. (*Díaz Luna 6549,* UC, US), and Edo. Méx. (*Hinton 2389,* BM, K; *Hinton et al. 8941,* K), but to be expected in adjacent areas. Chiapas Collections: *T&L 41783* (DS); *6222*; *33648*.

Apparently related to *Asplenium cladolepton* Fée, from Venezuela and Colombia, but that species is described as epiphytic and lacking buds. Another close relative may be *A. sciadophilum* Proctor, from Jamaica, also lacking buds and with simple, oblanceolate, falcate pinnules.

32. **Asplenium myriophyllum** (Swartz) Presl, Rel. Haenk. 1:48. 1825.

—*Caenopteris myriophylla* Swartz, J. Bot. (Schrader) 1800(2):60. "1801" [1802]. —Type: Jamaica, *Swartz s.n.* (S).
Asplenium monteverdense Hooker, Second Cent. Ferns pl. 41. 1860. —Type: Cuba, *Wright 1029* (K; isotype US).
Illustration: Eaton, Ferns No. Amer. 2:pl. 51, figs. 1–3. 1879.

Rhizome short-creeping to erect, small, compact; fronds mostly 6–20 cm long, 1.5–5 cm broad, elliptic, blade gradually tapering above and below (nearly to rhizome); stipe brownish, dull, ca. 0.5 mm diam., less than 2 cm long; blade essentially tripinnate, not proliferous; pinnae 10–20 pairs, petiolulate; ultimate segments elliptic to obovate (sometimes bilobed), rounded at tip, mostly 2–3 mm long, 1 mm wide; leaf tissue very thin, glabrous; sori solitary on ultimate segments, elliptic, ca. 1 mm long.

Most often reported on limestone rocks, also terrestrial, in Lower Montane and Montane rain forests, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; uncommon in widely scattered localities in Northern Highlands, Central Plateau; 700–1300 (2700) m. Southern Mex. (Ver., Oax.), Guat.; S.A. (Ven. and Col. to Peru?); Gr. Antill. Chiapas Collections: *G 256* (NY, PH); *Li s.n.* (P); *GM 59* (P); *22302*; *22499*; *31539*; *34697*.

Much of the Mexican and Central American material of this species has gone under the name *A. divaricatum* Kunze (Linnaea 9:71. 1834; type from Peru, Cerro de San Cristóbal prope Cassapi, *Poeppig [1151]*, isotypes W, B, P! photos of W and B isotypes at BM!), which I believe is specifically distinct from our material. A probable additional synonym of *A. myriophyllum* is the Florida plant known as *A. verecundum* Underw.

Asplenium myriophyllum is a highly variable species, closely related to *A. cristatum*. It can usually be distinguished from that species by the more finely cut blade, gradually reduced basal pinnae, and ultimate segments that are rounded at the tip; also it is generally a much smaller species than *A. cristatum*. In dissection, *A. myriophyllum* greatly resembles *A. conquisitum,* but that species has shiny stipes and rachises and flagelliform apices.

33. **Asplenium olivaceum** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:212, fig. 1, f–g. 1975.

—Type: Guatemala, Alta Verapaz, Senahu, Cerro Sillab, *Hatch & Wilson 149* (US!).
Illustration: only the original, p. 210.

Rhizome compact, bearing numerous erect or arcuate fronds; stipe blackish, glabrous, shining, ca. 0.6 mm diam., 0.2–0.6 times shorter than blade; fronds to 15 cm long, 1.5 cm broad, not proliferous, with an oval terminal segment; pinnae up to 15 pairs, olivaceous, articulate, opposite, oblong, to 8 mm long, 5 mm broad, entire or slightly undulate along acroscopic margin, rounded at apex; sori 1–2 per pinna, 2–3 mm long, largest (primary) sorus parallel to basiscopic margin, sometimes a second smaller sorus along an acropetal vein; indusia ± entire, to 0.9 mm wide, whitish or grayish.

Epipetric on limestone boulders and cliffs, Montane Rain Forest; rare in se Central Plateau (Lagos de Monte Bello); 1300 m; otherwise known only from type. Chiapas Collection: *22379A*.

34. **Asplenium polyphyllum** Bertol., Novi Comment. Acad. Sci. Inst. Bononiensis 4:443. 1840 (not Presl ex Goldman, 1843).

—*Asplenium bertolonii* Donn.-Smith, Enum. Pl. Guat. 4:189. 1895. —Type: Guatemala, Volcán Agua, *Velasquezius s.n.* (presumably BOLO).
Asplenium trichomones L. var. *viridissimum* Christ, Bull. Soc. Roy. Bot. Belgique 35:195. 1896. —Type: Costa Rica, Volcán Barba, *Tonduz 1937* (BR—2 sheets, photos BM!).
Illustration: Maxon (1913:pl. 1, h–k, opposite p. 150).

Rhizome compact, short-creeping to suberect; fronds linear, (20) 30–60 (100+) cm long, with stipe $^1/_6$–$^1/_3$ as long as blade, 1–2 mm diam., castaneous, shining; blade gradually tapering distally into a minute confluent terminal segment, below with several pairs of gradually reduced deltoid pinnae; rachis usually (always?) with a small scaly bud near frond apex; pinnae numerous, to 50 (80) pairs, these mostly oblong, to 2 cm long, 0.7 cm broad, rounded at apex, subentire to shallowly crenate, slightly auriculate at superior base, excavate or cuneate below; leaf tissue dark gray-green, glabrous; sori mostly 4–6 oblique pairs per pinna, on both sides of costa, 2–3 (4) mm long, ± straight to curved; indusia broad, grayish to whitish.

Terrestrial (occasionally epiphytic?) on moist steep slopes at high elevations, Evergreen Cloud Forest; locally common in s Sierra Madre, Central Plateau; 2700–3000 m. Southern Mex. (D.F., Oax.), Guat., Salv., C.R. Chiapas Collections: *GM 118* (DS); *G 214* (K, NY, PH); *G 249* (K); *22035*; *22077*; *31767*; *32052*; *40327*; *40449*.

Smaller specimens resemble plants of *A. castaneum,* but that species apparently always lacks buds.

I find rachis buds on all Chiapas specimens of *A. polyphyllum* except *Breedlove 22077,* from Zontehuitz, where *A. polyphyllum* with buds does grow (*Münch 118*). *Breedlove 22655A* is questionably *A. polyphyllum.*

35. **Asplenium praemorsum** Swartz, Prodr. Veg. Ind. Occ. 130. 1788.

—TYPE: Jamaica, *Swartz s.n.* (S).

ILLUSTRATIONS: Matuda, Anales Inst. Biol. Univ. Nac. México 27:143. 1956; Vareschi, Fl. Venez. 1(2):pl. 89. 1969.

Rhizome short-creeping to suberect, densely covered with filiform castaneous, clathrate scales; fronds few (2–5), 10–50 cm long, to 10 cm broad, ovate to deltoid; stipe ¼–⅔ as long as blade, 1–3 mm diam., brown to blackish, not shining, conspicuously scaly (especially towards base), scales 2–5 mm long, like those of rhizome; rachis with similar, but fewer, scales, also dark; blade bipinnate to bipinnate-pinnatifid below, pinnate-pinnatifid distally, with a confluent terminal segment; pinnae 7–15 (30) pairs, 2–11 cm long, 1–3 cm broad, incised into usually obovate or obtriangular segments, these usually sharply toothed and often deeply incised at tip; leaf tissue chartaceous to subcoriaceous, dark green, below with clathrate, usually persistent, filiform scales from an enlarged base; sori to ca. 1 cm long, straight; $n = 144$ (Jam.).

Epiphytic (ours), especially in Pine-Oak-Arbutus forests, also Seasonal Evergreen Forest and Tropical Deciduous Forest; widely distributed but in small populations, often single individuals, in Central Plateau and Northern Highlands, apparently rare in Eastern Highlands; 900–2700 m. Southern Mex. (Méx., Gro., Mich., Oax., Ver.), Guat., Salv., Nic., C.R., Pan.; S.A. (Col. to Ven. and NW Arg., s Braz.); Gr. Antill. CHIAPAS COLLECTIONS: *A 1260* (DS, NY, UC); *A 1276* (UC); *R 1073* (PH); *G 215* (K, NY, PH); *G 282* (K); *P 10866* (UC); *P 7240* (UC); *GM 75* (DS, US); *EM 5789* (MEXU); *L&S 9832* (US); *6370*; *23914*; *24831*; *27190*; *27222*; *27260*; *27545*; *27686*; *27914*; *28180*; *28709*; *29116*; *29319*; *31260*; *32079*; *32790*; *32707*; *32873*; *37268*; *37948*; *40761*; *40830.*

In Venezuela, Morton and Lellinger (1966:43) report this species as always saxicolous; in Chiapas, it is apparently always an epiphyte.

Several other names have been applied to Neotropical specimens of *A. praemorsum,* e.g., *A. aethiopicum* (Burm.) Becherer and its heterotypic synonyms (*A. furcatum* Thunb., *A. adiantoides* Lam.). All of these names have types from South Africa. Specimens from Africa are close to material of *A. praemorsum* from the New World, but they seem to differ in their somewhat greater dissection with ultimate segments usually linear. Morton and Lellinger (1966:43) have pointed out a scale difference between the two, but I have not checked this. *Asplenium aethiopicum* has priority.

36. **Asplenium pteropus** Kaulf., Enum. Fil. 170. 1824.

—TYPE: Brazil, *Chamisso s.n.*

Asplenium pseudoerectum Hieron., Hedwigia 60:239. 1918. —LECTOTYPE (chosen by Morton & Lellinger, 1966:17): Puerto Rico, *Sintenis 2637* (B; isolectotype US).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(2):pl. 86, fig. 2. 1969; Hooker, Sp. Fil. 3:pl. 177. 1860.

Rhizome short, suberect; fronds mostly 15–45 (60) cm long, 3–7 cm broad; stipe much shorter than blade, not more than one-sixth as long, greenish or gray-green, green-winged throughout, the wings ca. 0.5 mm wide; blade 1-pinnate, attenuate and pinnatifid at apex, the rachis green-winged, not proliferous; pinnae numerous, mostly 20–30 (40) pairs, oblong, 1.5–4 cm long, 0.5–1.0 cm wide, acute or acuminate at apex but not long-attenuate, inequilateral, excised at inferior base, subauriculate at superior base, toothed, the teeth on upper margin 6–12, rounded; veins 8–11 pairs, all simple except those of auricles; leaf tissue thin, light green, glabrous; sori 3–9 (12) pairs per pinna, straight, 1–2 (4) mm long, medial; indusia entire, whitish; $n = 36$ (Oax.).

Epiphytic on tree trunks, Tropical and Montane rain forests; Eastern Highlands; 300–800 m. Southern Mex. (Ver., Oax.), Bel., Guat., Nic., C.R.; S.A. (Col. to Guy. and s Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *GM s.n.* (DS, US); *26549*; *33095.*

Breedlove 26549 is very atypical with relatively thick leaf tissue and small fronds, but it is closer to *A. pteropus* than to any other described species.

37. **Asplenium pumilum** Swartz, Prodr. Veg. Ind. Occ. 129. 1788.

—TYPE: Jamaica, *Swartz s.n.* (S).

Asplenium minimum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):55, pl. 15, fig. 1. 1842. —SYNTYPES: Mexico, Veracruz, *Galeotti 6286,* and Oaxaca, *Galeotti 6424* (both BR!).

?*Athyrium verapax* Christ, Bull. Herb. Boissier (2)6:292. 1906. —*Asplenium leucothrix* Maxon, Proc. Biol. Soc. Wash. 43:85. 1930. —TYPE: Guatemala, Alta Verapaz, Cubilquitz, *v. Tuerckheim s.n.* (Donn.-Smith ed. 8818) (P!).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(2):pl. 84, fig. 3. 1969; Lowe, Ferns 5:pl. 31. 1858.

Rhizome erect, bearing at the apex narrow, almost filiform scales; fronds few, fasciculate, stipe atropurpureous at base, greenish or stramineous upwards, septate-hairy, about as long as or somewhat longer than blade; blade triangular in outline, (0.7) 4–8 (12) cm long, 5–9 (13) cm broad, simply pinnate, the apex acuminate, pinnatifid at base; rachis stramineous to greenish, not proliferous; pinnae 1–3 pairs, lowermost the largest, basiscopically developed, petiolulate to 3 mm, pinnatifid, the two basal lobes often nearly free; veins forked; leaf tissue herbaceous, light green or yellowish green, septate-hairy on both sides, especially along veins (hairs whitish, often 1 mm long or more); sori 2–8 mm long with a whitish ciliate indusium; $n = 36$ (Jam.).

Along streams and on rocks (terrestrial or epipetric), in Tropical Deciduous Forest, Seasonal Evergreen Forest, Tropical, Lower Montane, and Montane rain forests, Pine-Oak Forest, Pine-Oak-Liquidambar Forest; widely scattered in Sierra Madre, Gulf Coastal Plain, Northern and Eastern highlands; 300–1600 m. Southern and W Mex. (Baja C.S., Sin., Nay., Jal., N.L., Méx., Ver., Oax., Tab., Yuc.), Guat., Nic., C.R., Pan.; S.A. (Col. and Ven. to Peru, Braz., NW Arg.); Antill., Trin. CHIAPAS COLLECTIONS: *GM s.n.* (DS, US); *G 443* (NY); *21736*; *21911*; *27370*; *28637*; *29929*; *32848*; *33925*; *36710*; *38160*; *39140*; *40083*; *42832.*

Rovirosa 862 (NY, PH), collected in the vicinity of Ixtacomitan, may represent an undescribed but closely allied species. It differs from *A. pumilum* in the rather sharply serrate pinnae, the much longer sori, totally glabrous fronds, and in having darkened stipes throughout. I have seen similar collections from Veracruz and San Luis Potosí.

38. **Asplenium pyramidatum** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:249. 1849.

—TYPE: Mexico, Oaxaca, between Tanetze and Cacalotepec, *Liebmann* [Liebm. Pl. Mex. 2297, Fl. Mex. 332 and 333] (C!). I choose Fl. Mex. 333 as lectotype.

Asplenium auritum Swartz var. *bipinnatifidum* Kunze, Linnaea 18:332. "1844" [1845]. —TYPE: Mexico, *Leibold 14* (LZ, destroyed).

Asplenium auritum Swartz var. *bipinnatisectum* Mett., Abh. Senckenberg. Naturf. Ges. 3:147. 1859. —LECTOTYPE (chosen by Morton & Lellinger, 1966:20): Mexico, *Schiede & Deppe [773]* (B).

Diplazium bakerianum Domin, Kew Bull. 1929:219. 1929. —TYPE: Costa Rica, *Cooper s.n.* (K!).

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 85. 1969 [as *A. auritum*].

Similar to *A. auritum*, but the pinnae deeply pinnatifid, especially on upper side, with a nearly free superior basal auricle (subentire to toothed at tip), excavate on lower basal side; pinnae stalked 3–5 mm, deltoid, usually long-attenuate at tip, directed upwards; lower pinnae the largest; spores small, reniform, tan, 64 per sporangium.

In Lower Montane and Montane rain forests; scattered in Northern and Eastern highlands; 600–1000 (1600) m. Range uncertain, but at least s Mex. (S.L.P., Mlos., Ver., Oax.), Guat., C.R., Pan.; Cuba, L. Antill.; probably also over much of S.A. CHIAPAS COLLECTIONS: *G 281* (K); *R 1072* (PH); *21644*; *22500*; *27430*; *27457*; *29865*.

This seems to be the most widespread member of the *A. auritum* complex. I have seen similar, if not conspecific plants from many areas in South America. Another synonym may be *A. dispersum* Kunze.

From *A. sphaerosporum*, this species differs in the small fronds (less than 40 cm long), pinnae deltoid, pinnatifid with usually a single nearly free acroscopic segment, the lower base excised, and in the spores. *Asplenium pyramidatum* occurs at lower elevations than *A. sphaerosporum* in Chiapas.

39. **Asplenium radicans** L., Syst. Nat., ed. 10, 2:1323. 1759.

—*Asplenium rhizophyllum* L., Sp. Pl., ed. 2, 2:1540. 1763 (not L., 1753). —*Asplenium rhizophoron* L., Gen. Pl., ed. 6, emend. 1764 (an illegitimate renaming of *A. rhizophyllum* L., 1763). —TYPE: probably Jamaica, *Browne s.n.* (LINN 1250.16).

Asplenium alloeopteron Kunze ex Klotzsch, Linnaea 20:353. 1847. —SYNTYPES: British Guiana [=Guyana], *Schomburgk 1150, 1206* (B; isosyntype UC?).

Asplenium cyrtopteron Kunze, Linnaea 23:233, 303. 1850. —LECTOTYPE (chosen by Morton & Lellinger, 1966:37): cultivated specimen (Hort. Berol. ex hb. A. Br.), originally from Venezuela (B).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(2):pl. 83, fig. 19. 1969; Lowe, Ferns 5:pl. 12. 1858.

Rhizome erect; fronds few, arching, to ca. 70 cm long, 15 cm wide; stipe atropurpureous, shining, mostly 10–25 cm long, 1.5–2 mm diam.; blade ovate-lanceolate, lowest pinnae the largest or only slightly shortened, deflexed, blade gradually attenuate toward apex with a flagelliform tip to ca. 10 cm long, ending in a bud; pinnae mostly 15–25 pairs, the lower pinnatifid to 1-pinnate, to ca. 8 cm long, 2 cm wide; segments oblong to obovate, broadly adnate to cuneate at base, up to ca. 10 pairs per pinna, entire or nearly so; leaf tissue thick-herbaceous, glabrous; sori mostly 1–3 per segment, mostly 2–4 mm long; $n = 72, 108, 144$ (Jam., *A. radicans* s.l.).

Terrestrial in wet forests, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; uncommon, widely scattered localities in the N Sierra Madre, Northern Highlands, N Central Plateau; 900–1700 m. Range uncertain, but at least s Mex. (Ver.), Nic., C.R.; S.A. (Guy., Ven., Col.); Jam., Hisp. CHIAPAS COLLECTIONS: *GM 143* (DS, US); *G 427* (YU); *31232A*; *31318*; *32427*.

I maintain this species in a restricted sense, including only specimens that are pinnate-pinnatifid to subbipinnate. Pinnules are entire, never toothed. The once-pinnate member of the *A. radicans* complex (*A. cirrhatum* L. C. Rich. ex Willd.) is known from the West Indies, Trinidad, Oaxaca, Costa Rica, Panama, and South America (Braz., Ven., Col., Bol.), but has not yet been found in Chiapas. I am inclined to regard it as specifically distinct. Four of the five Chiapas specimens of *A. radicans* seen are fully bipinnate, with several pairs of nearly free pinnules on the lower pinnae, the pinnules cuneate at their base; these collections match the type of *A. alloeopteron* quite well. The remaining Chiapas collection (*31232A*) closely resembles the type of *A. radicans*.

Asplenium radicans has been found to be cytologically complex by Walker (Trans. Roy. Soc. Edinburgh 69:109–135. 1973) and obviously needs additional cytotaxonomic study.

40. **Asplenium repandulum** Kunze, Linnaea 9:65. 1834.

—TYPE: Peru, *Poeppig s.n.* (fragment NY).

Asplenium riparium Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:244. 1849. —SYNTYPES: Mexico, Veracruz, Barranca de Jovo, *Liebmann* [Liebm. Pl. Mex. 2283, Fl. Mex. 306, 308, 309, 310] (C!; isosyntypes K!—2 sheets). Two additional syntypes: Mexico, Veracruz, Barranca de Mirador, *Liebmann* [Liebm. Pl. Mex. 2283, Fl. Mex. 305, 311] (C!); one additional syntype: Barranca de San Francisco, pr. Mirador, *Liebmann* [Liebm. Pl. Mex. 2282, Fl. Mex. 307] (C!). I choose Fl. Mex. 310 as lectotype.

ILLUSTRATIONS: Ettingshausen, Farnkr. pl. 89, 90. "1865" [1864]; Hooker, Sp. Fil. 3:pl. 169. 1860.

Rhizome long-creeping, often 10 cm or more long, 2.5–5 mm diam., nearly scaleless; fronds relatively few, with stipe brownish, not shining, mostly 10–16 cm long, 2–3 mm diam.; blade 1-pinnate, mostly 20–30 cm long, 10–22 cm broad, the apical pinna subconform or hastate, not proliferous; rachis brownish, scaleless, not winged; pinnae (8) 10–15 (25) pairs, lanceolate, often falcate, short-petiolate (1–2 mm), 1.5–2 cm broad, obliquely cuneate at base, upper base straight and parallel to rachis, the lower straight and ± perpendicular to rachis, sometimes auriculate at superior base, usually serrate along margin, acute or acuminate at pinna apex; leaf tissue glabrous, drying very dark greenish or blackish, herbaceous; veins 1-forked; sori elongate, often slightly curved, to 13 mm long; indusia entire, dark; $n = 39–40$ (Chis.).

On rocks in or adjacent to streams, Montane Rain Forest; widely scattered but locally common in Northern Highlands (Jitotol Ridge), Sierra Madre; 1250–2100 m. Southern Mex. (Ver., Oax.), Guat., Nic., C.R.; S.A. (Col. and Ven. to Bol., s Braz.). CHIAPAS COLLECTIONS: *EM 221* (MEXU); *G 416* (cited in Hemsley, Biol. Centr.-Amer. 3:637; K, not seen);

GM s.n. (P); *23129*; *26082*; *29819*; *32617*; *34373*; *35410*; *38081*.

Morton and Lellinger (1966:12) stated that this species is normally an epiphyte; however, in Chiapas it grows on wet rocks along or in streams.

41. **Asplenium resiliens** Kunze, Linnaea 18:331. "1844" [1845].

—*Asplenium parvulum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):60, pl. 15, fig. 3. 1842 (not Hook., 1840). —Type: Mexico, Oaxaca, "environs de Capulalpan et de l'Hacienda del Carmen," *Galeotti 6462* (BR! photo BM!; isotypes BR!—2 sheets P!).

Illustrations: original; Small, Ferns SE States 188. 1938.

Rhizome erect, short, apex with narrow black or brown-margined scales; fronds numerous, (3) 8–30 (45) cm long; stipe and rachis atropurpureous to black, shining, adaxially flattened with minute tan wings; blade 1-pinnate, linear, with several (2–6) pairs of proximal pinnae reduced about half, distal pinnae evenly reduced to a minute, confluent, sometimes hastate or spatulate terminal segment; pinnae mostly 20–40 (60) pairs, acroscopically subauriculate, basiscopically excised, lowermost pinnae deflexed, subcordate at base, the medial pinnae oblong to linear-oblong, deflexed or horizontal, to ca. 1.3 (1.6) mm long, 2–5 mm wide, the acroscopic margin entire to minutely serrate; leaf tissue chartaceous to subcoriaceous; sori on both sides of costules, 1–2 mm long, up to 6 pairs; indusia whitish; $n = 2n = 108$ (Fla.).

Stream banks and limestone rocks (terrestrial or epipetric) in Pine-Oak or Pine-Oak-Liquidambar forests, less often Evergreen Cloud Forest, Montane Rain Forest; relatively common in Sierra Madre, Central Plateau, Northern Highlands; 1350–2400 (3000) m. Eastern and s Mex. (Coah., N.L., S.L.P., Mlos., Oax.); S.A. (Ven. to Urug., n Arg.); s U.S. (s Pa. to Fla. w to Nev. and Ariz.), Jam., Hisp. Chiapas Collections: *A 1256* (DS, UC); *R 1053* (PH); *Li 1547* (K); *EM 213* (MEXU); *R&R&M 1083* (US); *G 225* (US); *G 245*, pt. (PH); *G 264* (K, YU); *Ho 3* (US); *7902*; *22763*, pt.; *31424A*; *32015*; *32317*; *40738*; *41322*; *41434*; *42021*.

Closely related to *A. monanthes* and several times collected with that species. Small or depauperate specimens of *A. monanthes* may be especially difficult to distinguish from *A. resiliens*. Generally plants of *A. resiliens* are much smaller and the pinnae bear sori on both sides of the costa.

42. **Asplenium salicifolium** L., Sp. Pl. 2:1080. 1753.

—Lectotype (chosen by Morton & Lellinger, 1966:23): Plumier, Tract. Fil. Amer. pl. 60. 1705, illustrating a plant from the French West Indies.

Asplenium bicrenatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:245. 1849. —Type: Mexico, Oaxaca, District Chinantla, *Liebmann* [Liebm. Pl. Mex. 2292, Fl. Mex. 320] (C! fragm. US!).

Illustration: Vareschi, Fl. Venez. 1(2):pl. 87, figs. 5–6. 1969.

Rhizome suberect; fronds few, to 60 cm long, 10–15 (20) cm broad, subabruptly reduced toward apex with a ± confluent hastate terminal segment; stipe brownish but narrowly green-winged, one-half to nearly as long as blade; rachis brown to greenish, not proliferous; pinnae 7–16 pairs, subfalcate, petiolate 2–3 mm, inequilaterally lanceolate, acroscopically subcordate-auriculate, auricle sometimes overlapping rachis, basiscopically excised or cuneate, margins simply or doubly crenate; veins mostly 1–2-forked; leaf tissue chartaceous to subcoriaceous, olive-green, glabrous; sori to 10 mm long, oblique, straight, to ca. 8 pairs per pinna.

Usually epiphytic, on logs in Montane and Lower Montane rain forests; rare in Eastern Highlands; 800 m. Southern Mex. (Ver., Oax.), Bel., Nic., C.R.; S.A. (Col. to Peru and Sur., Braz.); Antill., Trin. Chiapas Collections: *32933*; *41985*.

Closely related to *A. auriculatum*, seemingly differing mostly by its much larger fronds with remote pinnae. In Chiapas (and southern Mexico) it is much less common than *A. auriculatum*.

43. **Asplenium serra** Langsd. & Fisch., Icon. Fil. 16, pl. 19. 1810.

—Type: Brazil, Santa Catarina, *Krusenstern s.n.* (*Langsdorff*) (presumably LE; isotype B—Herb. Willd. 19880).

Asplenium insigne Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:246. 1849. —Type: Mexico, Oaxaca, between Totontepec and Trapiche de la Concepción, *Liebmann* [Liebm. Pl. Mex. 2293, Fl. Mex. 299 and 300] (C!). I choose Fl. Mex. 300 as lectotype.

For additional synonymy, see Morton & Lellinger (1966:40).

Illustrations: see excellent original; also Vareschi, Fl. Venez. 1(2):pl. 83, fig. 14. 1969; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 14, figs. 5–6. 1897; Lowe, Ferns 5:pl. 8. 1858.

Rhizome long-creeping to suberect, 5–20 mm diam., densely and conspicuously scaly, the scales linear-lanceolate, filiform-tipped, to 15 mm long, castaneous, often iridescent; fronds (30) 50–150 cm long, usually with a subconform or hastate terminal segment; stipe 2–8 mm diam., tan to usually atropurpureous, with filiform scales at base; rachis inconspicuously scaly to glabrescent, usually darkened; pinnae numerous, lanceolate, 7–15 (20) cm long, 1–3 cm broad, long-attenuate, cuneate at base, sometimes excised below and/or auricled above, pinna margins usually sharply serrate or biserrate; costae below sparingly scaly; veins mostly 2–3-forked, at about 30° angle from costa; leaf tissue chartaceous to subcoriaceous, often shining; sori 5–20 mm long, ca. 1 mm broad, straight or slightly curved; $n = 72$ (Gal.).

Epiphytic (occasionally on mossy rocks), Lower Montane and Montane rain forests, Evergreen Cloud Forest; relatively common in Sierra Madre, Northern and Eastern highlands, Central Plateau; 1000–2800 m. Southern Mex. (Ver., Hgo., Oax.), Guat., Nic., C.R., Pan.; S.A. (Col. to Ven. and Bol., s Braz., Parag., Urug., nw Arg.); Antill., Trin. Chiapas Collections: *GM 99* (DS); *G 281a* (K, NY); *X&S X-337* (US); *T 1989* (DS); *9539*; *15223*; *15362*; *21520*; *21629*; *22025*; *23225*; *24935*; *24973*; *25431*; *26815*; *30123*; *31800*; *32044*; *32978*; *33559*; *34616*.

44. **Asplenium serratum** L., Sp. Pl. 2:1079. 1753.

—Lectotype (chosen by Proctor, Fl. L. Antill. 2:313. 1977): Plumier's Descr. Pl. Amer. pl. 39, 1693, based on material from either Martinique or Hispaniola. Proctor rejected Morton & Lellinger's (1966:9) choice of lectotype.

Illustrations: Eaton, Ferns No. Amer. 1:pl. 3. 1880; Vareschi, Fl. Venez. 1(2):pl. 88. 1969; Hooker, Fil. Exot. pl. 70. 1859.

Rhizome massive, erect, bearing masses of densely tomentose roots, scaly at apex, scales brown, clathrate, linear-lanceolate, ca. 1 cm long; fronds numerous, fasciculate, nearly sessile, stipe usually less than 5 (10) cm long; blade simple, linear-oblanceolate, mostly 35–75 (100) cm long, 6–16 cm broad, acute at apex, gradually narrowed towards base, subentire to erose to serrate along margin; veins 1-forked near base; leaf tissue chartaceous, glabrous; sori elongate, beginning near midrib and extending ½–⅔ distance to margin; n = 72 (Fla.).

Epiphytic on fallen trees, occasionally on rocks, in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; common in Northern and Eastern highlands, E edge of Central Plateau, Pacific Coastal Plain; 300–1200 m. Southern Mex. (Ver., Oax., Tab.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., NE Arg., Parag.); Fla., Antill., Trin. CHIAPAS COLLECTIONS: *EM 18102* (DS, MEXU, US); *So 1661* (MEXU, US); *R&R&M 925* (US); *22143*; *22476*; *27436*; *32940*; *33127*; *33166*; *33861*; *34070*; *34897*; *38207*; *41983*; *42852A*.

45. **Asplenium sessilifolium** Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:322. 1811.

—TYPE: "America equinoctiali," collector not stated (P! photo BM!).

Asplenium sessilifolium var. *guatemalense* Hieron., Bot. Jahrb. Syst. 34:461. 1904. —SYNTYPES: Guatemala, *Lehmann 1480* (B; isosyntype BM!); *Heyde & Lux s.n.*, Donn.-Smith ed. 4670, 4671 (B). Costa Rica, *Wendland 710* (B).

ILLUSTRATION: Hieronymus, Hedwigia 47:pl. 3, figs. 9, 10, 11. 1908.

Rhizome erect (caudex to 12 cm long), apex densely scaly; fronds mostly 25–45 cm long, 3–5 cm broad, with several pairs of gradually shortened pinnae below, attenuate distally, often (but not always) with apex terminating in a small scaly bud, these occasionally developing plantlets while still attached; stipe ca. $^1/_6$–$^1/_4$ length of blade, brown to atropurpureous, dull, 1–2 mm diam.; rachis similar in color; pinnae opposite below, ca. 30 or more pairs, oblong, mostly 0.5–1.0 cm wide, the most developed with a single oval or flabellate, nearly free superior basal segment, then bicrenately incised along upper margin, excised or cuneate at base below, then shallowly crenate-serrate toward tip; leaf tissue dark green, thin, herbaceous, glabrous; sori slightly curved, 2–3 mm long, ca. 4–6 pairs per pinna; n = 36 (Chis.).

Epiphytic or terrestrial, steep wooded slopes or bases of trees, especially in Evergreen Cloud Forest, also Montane Rain Forest; common in Central Plateau, Sierra Madre; (1200) 2100–3000 m. Southern Mex. (Chih., Dgo., Sin., Oax., Hgo.), Guat., Nic., C.R.; S.A. (Col. to Peru). CHIAPAS COLLECTIONS: *G 223* (K, NY, PH); *L&S 9882* (US); *T 1992A* (DS) *La 160A* (DS); *GM 57* (DS); *9296*; *21989*; *22046*; *22801*; *25040*; *25294*; *26269*; *26823*; *27217*; *30126*; *30175*; *31775*; *32036*; *32051*; *33704*; *34606*; *34681*; *40442*; *40506*.

Most closely allied to *A. potosinum, A. munchii,* and *A. miradorense*.

Collections from North America do not match very well specimens from South America. The latter approach more closely *Asplenium triphyllum* Presl, and lack buds near the frond apex. Most North American collections have a subterminal bud that may develop into a plantlet while still attached to the parent frond.

46. **Asplenium soleirolioides** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:212, fig. 1, c–e. 1975.

—TYPE: Mexico, Chiapas, Munic. La Grandeza, 10 km E of El Porvenir, *Breedlove* (*with Smith*) *31820* (DS!).

ILLUSTRATION: only the original, p. 210.

Rhizome minute, hidden by roots and scales, bearing numerous arcuate or decumbent fronds; stipe and rachis castaneous, glabrous, shining, ca. 0.3 mm diam.; fronds to 9 cm long, 5 mm wide, towards the apex proliferous and rooting; pinnae below the gemma up to 15 pairs, light green, articulate, mostly alternate, roundish or irregularly oval, to 4 mm long, 3 mm wide, with 2–3 veins; sori 1–2 per pinna, the largest along inferior vein in each segment; indusia entire, to 0.6 mm wide, whitish to tannish.

Epiphytic on bases of old trees or epipetric on rocky cliffs; S Sierra Madre; 2800 m. Otherwise known only from Oaxaca (*Smith 509,* UC). CHIAPAS COLLECTION: only the type.

47. **Asplenium solmsii** Baker ex Hemsley, Biol. Centr.-Amer. 3:639. 1885.

—TYPE: Guatemala, "cuesta de Atitlán," *Bernoulli & Cario 317* (K, not found).

ILLUSTRATION: none found.

Rhizome erect, ca. 1 cm diam.; fronds caespitose, with stipe to 20 cm long, 3 mm diam., gray-green, dull, ± glabrous; rachis glabrous or with a few minute clathrate scales in axils of pinnae; blade nearly 3-pinnate, to ca. 35 cm long, 15 cm broad; pinnae lanceolate-attenuate, inequilateral, basiscopic pinnules somewhat shorter, more oblique; pinnules decurrent on costa, deeply pinnatifid, the largest 2.4 cm long, 5–6 mm broad, the lobes ca. 1 mm broad, oblique, often falcate, some bifid at tip, acute; sori to 1.5 mm long, furnished with linear indusia 0.3 mm wide, indusia whitish, entire.

Terrestrial; uncommon in Sierra Madre (Mt. Ovando); 900–1000 m. Known only from Chis. and Guat. CHIAPAS COLLECTIONS: *EM 4173* (MEXU, NY, US); *EM 2637* (F, K, MEXU, NY, UC, US).

This name has usually been applied to an allied, but distinct, species from Costa Rica and Panama. *Asplenium solmsii* apparently occurs at lower elevations than its closest Mexican relative, *A. achilleifolium* (mostly 1500–2300 m), from which it differs in the more dissected blade.

48. **Asplenium sphaerosporum** A. R. Smith, Amer. Fern J. 70:17, figs. 3–6. 1980.

—TYPE: Mexico, Chiapas, SE side of Cerro Baul, *Breedlove* (*with Smith*) *21805* (DS).

ILLUSTRATION: only the original.

Rhizome erect; fronds mostly 45–70 cm long, to 18 cm broad; stipe blackish, ca. 2 mm diam., glabrous, ca. ½–¾ blade length; rachis blackish to greenish, becoming green-winged distally; blade lanceolate, acuminate at confluent apex; pinnae subhorizontal, mostly 25 or more pairs, long-acuminate, several lower pairs fully bipinnate, upwards the pinnae becoming pinnatisect, then serrately incised; segments obovate, to 1.3 cm long, 5 mm wide, cuneate at base, dentate or denticulate at tip (teeth 2–7), up to 12 pairs on larger pinnae, becoming increasingly adnate and decurrent toward tips of pinnae; leaf tissue dark green or bluish green, thick, glabrous; sori 2–3 on larger segments; spores large, globose, 32 per sporangium.

Epiphytic or on fallen logs, especially in Pine-Oak-Liquidambar Forest, less often in Seasonal Evergreen Forest, Montane Rain Forest, or Evergreen Cloud Forest; common in Northern Highlands, N Sierra Madre, scattered in Central Plateau; (900) 1250–2700 m. Known only from S Mex. (Ver., Gro.) and Guat. CHIAPAS COLLECTIONS: *G 404* (K, NY, PH); *GM s.n.* (DS); *R 1049* (PH); *6368*; *21810*; *22303*; *28723*; *28733*; *29138*, pt.; *29244*; *31338*; *32311*; *32512*; *32758*.

This species resembles somewhat *A. achilleifolium*, but I do not think that they are closely related. The affinity seems closest to *A. monodon* and *A. cuspidatum*. The former has large globose spores, 32 per sporangium, like those of *A. sphaerosporum*; all specimens of *A. cuspidatum* that I have looked at have small, reniform spores, 64 per sporangium. It is possible that *A. sphaerosporum* arose through hybridization between some member of the *A. auritum* group and *A. cuspidatum*. Alternatively, it could have speciated from *A. monodon*. Additional studies are needed to understand the evolutionary relationships within this complex group.

Asplenium sphaerosporum occurs at higher elevations than any other member of the *A. auritum* complex in Chiapas, at elevations where *A. cuspidatum* can occur. The latter is chiefly from Montane Rain Forests, while *A. sphaerosporum* is most common in Pine-Oak-Liquidambar Forests.

A possible hybrid is *Breedlove 24054*, from eastern base of Cerro Tres Picos, 1500 m; it has abortive spores.

49. **Asplenium tuerckheimii** Maxon, Contr. U.S. Natl. Herb. 13:15. 1909.

—Type: Guatemala, Baja Verapaz, Panzál, *Tuerckheim II 1677* (US).
Illustration: **Fig. 11.**

Rhizome erect; fronds few (1–4), (16) 30–40 cm long, with stipe mostly 1–1.5 times blade length, 1–2 mm broad, brownish, dull; blade 1-pinnate, with (1.5) 3–5 (6) pairs of lateral pinnae and a conform terminal one, or terminal pinna lacking; pinnae (3.5) 8–11 cm long, sessile, ascending, equally long-cuneate at base, falcate, attenuate at apex, margins crenate-serrate, the crenations broad, usually shallow (sometimes sharp), entire or faintly notched in middle; leaf tissue herbaceous, dark green or brownish green, glabrous; sori 5–8 mm long, oblique, slightly curved, ca. 9–14 pairs.

Terrestrial in Tropical to Montane rain forest; Eastern and Northern highlands; 300–1400 (2700) m. Southern Mex. (Ver., Oax.), Guat. Chiapas Collections: *GM s.n.* (DS, US); *MC 1770* (US); *22299*; *22493*; *31540*; *32550*; *33081*; see also discussion below.

In describing this species, Maxon stated that the alliance is "perhaps with *A. abscissum* Willd., though the relationship is by no means a close one." I believe that these two species are indeed closely related, and in fact there are several specimens from our region that are nearly intermediate. Collections from the Jitotol Ridge (*32383*; *32624*; *32753*) have rather deeply serrate pinna margins, much like those in typical *A. abscissum*. Some of these specimens have a terminal pinna, some do not; the terminal pinna is even slightly lobed, as in *A. abscissum,* in two of these specimens. Typical *A. abscissum* is not known from the Jitotol Ridge. Additional specimens that tend toward *A. abscissum* are Breedlove *34678*, *35180*, and *38962*. I tentatively place them here because of overall resemblance to *A. tuerckheimii*.

50. **Asplenium uniseriale** Raddi, Opusc. Sci. 3:291. 1819.

—*Asplenium rachirhizon* Raddi, Pl. Bras. 1:39, pl. 56. 1825. —*Asplenium radicans* L. var. *uniseriale* (Raddi) L. D. Gómez, Brenesia 8:53. 1976. —Type: Brazil, *Raddi s.n.* (presumably FI).
Asplenium amabile Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:251. 1849. —Type: Mexico, Oaxaca, between La Galera and Pochutla, *Liebmann* [Liebm. Pl. Mex. 2299, Fl. Mex. 350, 351, 352] (C!, isotype K!). I choose Fl. Mex. 352 as lectotype.
Illustration: see that cited above.

Rhizome erect; fronds few, mostly 50–75 cm long with a long flagelliform apex that bears a minute bud at tip; stipe atropurpureous, shining, ca. ½–⅔ blade length; blade 3-pinnate, lowest pinnae largest or nearly so; larger pinnae usually with minute buds at tip; ultimate segments linear-oblong to obovate, ca. 4 mm by 1 mm, acutish at tip; leaf tissue green, relatively thin, glabrous; sori 2–4 mm long on ultimate segments.

Terrestrial in Montane and Lower Montane rain forests; widely scattered in Sierra Madre, Eastern and Northern highlands, se Central Plateau; 350–1300 m. Range not known but at least s Mex. (Oax.); S.A. (s Braz.); Hisp. Chiapas Collections: *EM 885* (MEXU, US); *X&S X-283* (US); *G 382* (NY); *G 383* (K, NY); *P 6733* (PH, UC, US); *P 6745* (NY, UC, US); *P 6863* (UC, US); *R 818* (NY, PH); *33089*; *35174*.

Similar to and possibly not distinct from *A. flabellulatum,* differing in being fully tripinnate, the ultimate segments linear-oblong to obovate. *Asplenium uniseriale* in Chiapas has always been collected at lower elevations than *A. flabellulatum*. The two Breedlove collections cited seem to bridge the gap between the two species; however, they were collected in areas of the state where neither species in their typical form has been found.

51. **Asplenium virillae** Christ, Bull. Herb. Boissier (2)4:1090. 1904.

—Type: Costa Rica, Río Virilla, *Alfaro s.n.* [Herb. costar. 16448] (P!).
Asplenium alfredii Rosenst., Repert. Spec. Nov. Regni Veg. 22:8. 1925. —Type: Costa Rica, *A. & C. Brade 424* (S, photo BM!; isotypes K! UC!).
Illustration: **Fig. 11.**

Rhizome small, erect; fronds to 12 cm long, 4 cm broad; stipe to 6 cm long, 0.5–1.0 mm diam., darkened at base, stramineous to greenish distally, dull; blade with (1) 2–5 pairs of lateral pinnae, petiolulate 1–2 mm; pinnae oblong (less than 1.5 times longer than wide), obtuse at apex, entire to dentate to weakly lobed along acroscopic margin and tip, entire or nearly so along basiscopic margin; leaf tissue thin, green, glabrous; sori to 5 pairs per pinna, mostly 2–4 mm long.

Terrestrial in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in n Sierra Madre; 1500–1800 m. Salvador, Nic., C.R.; Col. Chiapas Collections: *21798*; *25070*.

My placement of the two Chiapas specimens here is tentative, as they differ from Costa Rican material of *A. virillae* in having slightly dentate pinna margins and shorter-stalked pinnae.

Asplenium virillae is closely related to *A. abscissum,* differing in the small fronds with few pairs of pinnae, pinnae less than 1.5 times longer than wide and obtuse at the tip. Juvenile, depauperate, or precociously fertile specimens of *A. abscissum* are difficult to distinguish from *A. virillae,* and it is possible that the two represent only growth stages or ecological variation.

52. **Asplenium williamsii** Stolze, Amer. Fern J. 68:57, figs. 1–4. 1978.

—TYPE: Guatemala, El Progresso, Montaña Canahui, *Steyermark 43791* (US; isotype F).
ILLUSTRATION: only the original.

Similar to *A. miradorense* but differing from that in the narrowly to conspicuously alate stipe (wings 0.3–0.8 mm broad); fewer pinnae (14–22 pairs); sori 3–8 mm long, often nearly reaching from midrib to margin but tending to be more inframedial, the proximal one or two often diplazioid. From *A. sessilifolium,* another close relative, differing in the lack of rachis buds and acroscopic auricle not so deeply incised.

Epiphytic (ours) in Evergreen Cloud Forest; uncommon in Central Plateau; 2300–2700 m. Southern Mex. (Chis. only), Guat. CHIAPAS COLLECTIONS: *33685*; *34696*.

Asplenium williamsii is like *A. miradorense* in having dull, grayish-brown stipes and l-forked veins; however, in Chiapas, the latter is generally (always?) terrestrial and at lower elevations (below 2000 m).

Asplenium spp.

The following collections are not precisely assignable to any of the previous species and may be undescribed. I hesitate to describe them because of the limited number of collections:

Matuda 186bis, US (Mt. Ovando, s Sierra Madre) —Possibly related to such species as *A. otites* Link and in the group of species with *A. miradorense.* Fronds are 15 cm long or less, with pinnae 30–40 pairs, crowded, reduced at the base nearly to the rhizome.

Breedlove 21707 (*with Smith*) (Cerro Baul, 1600 m) —Most closely related to *A. lamprocaulon,* but differing from that in having more numerous pinnae (30–40 pairs) that are rounded at the tip, a smaller apical segment, and entire superior pinna margin.

Breedlove 15410 (Jitotol Ridge, 2000 m, epiphyte) —Similar to *A. williamsii,* but lacking the alate stipe and occasional diplazioid sori characteristic of that species. Also resembling *A. miradorense,* but that species occurs at lower elevations, is always terrestrial, and has more sharply biserrate pinnae.

Breedlove 39059 (6–8 km E of Frontera Comalapa, 1000 m) —Possibly related to *A. laetum,* but the blade is very narrow (3.0–3.5 cm wide), pinnae numerous (ca. 20 pairs) and obtuse at tip, and the rhizome seemingly erect. Similar, but with larger fronds, is *Breedlove 31319* (*with Smith*), from Cerro Baul, 1600 m. All collections of *A. laetum* in Chiapas have been made between 200 and 1000 m, mostly in the Northern and Eastern highlands.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Asplenium cuneatum Lam. —Guat. to Peru, Braz., W.I., O.W. Similar in dissection to some forms of *A. flabellulatum,* but the rachis gray to brown, not shining, ultimate segments obovate with flabellate venation, longer sori.

Asplenium dissectum Swartz —Oax., Nic., C.R., Pan., Cuba, Jam., Hisp., S.A. (Col., Ecu., Ven., Braz.). Related to *A. serra,* but with deeply serrately incised or lacerate pinna margins and smaller, more delicate fronds.

Asplenium obesum Baker [Syn. *A. kellermanii* Maxon, *A. pinnatum* Copel.] —Gro., Guat. (type). Most closely related to *A. lamprocaulon,* but differing in the fewer and larger pinnae (4–9 pairs, each pinna 5 by 2.5 cm long); stipe and rachis atropurpureous, shining. There is a note by Morton in US that *Linden 1535* (FI) from Yerba Buena, Chiapas, "is a mixture of *A. monanthes* and what I take to be *A. kellermanii* from memory." I have not seen the specimen in question, but most likely it is *A. lamprocaulon* (which has been collected several times near Yerba Buena) and not *A. obesum. Linden s.n.* (P, photo UC!) from Yerba Buena is *A. lamprocaulon.*

Asplenium palmeri Maxon —Western Tex. to Ariz., Chih., Son., S.L.P., Hgo., Dgo., Jal., Oax., Guat., Ven. Very similar to smaller forms of *A. resiliens,* but with a flagelliform apex that bears a small bud at the tip.

Holodictyum ghiesbreghtii (Fourn.) Maxon —Known only from Oaxaca. Simple fronds with an entire margin, areolate venation. Doubtfully distinct is *H. finckii* (Baker) Maxon, known from Ver. and Tam.

Loxoscaphe theciferum (H.B.K.) Moore. —Ver., Nic., C.R., Pan., Hisp., S.A. (Ven. to Peru); closely related, if not conspecific, plants occur in Africa. An epiphyte with fleshy fronds and sori in pouches near the margin.

12. ATHYRIUM

Athyrium Roth, Tent. Fl. Germ. 3:31, 58. 1799. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 327. 1875): *Athyrium filix-femina* (L.) Roth [≡*Polypodium filix-femina* L.]. See Webbia 8:437–442. 1952.

Plants terrestrial; rhizome commonly erect, dictyostelic, scaly at apex, the scales tan, glabrous, without distinct cell walls; fronds mostly monomorphic; stipe stramineous, commonly blackened at base, succulent and easily crushed with fingers, with 2 lunate vascular strands (cross section) at base; blade 1-pinnate to commonly 2-pinnate or more divided; veins free, simple or forked; leaf tissue thin, herbaceous, glabrous; sori lunate, sickle-shaped, or short-linear, indusiate in most species; indusia membranaceous, commonly curved around distal end of sorus and opening outwardly; sporangia with slender pedicels ca. 3 rows wide; spores bilateral, monolete, with a perispore; $x = 40$.

Copeland (1947) defined *Athyrium* so as to include *Diplazium.* Most other recent authors have recognized both genera, and I follow the latter course. The two genera differ in chromosome base number ($x = 41$ in *Diplazium*), as well as several admittedly subtle morphological characters. The distribution of *Diplazium* is primarily tropical, while that of *Athyrium* is primarily temperate, with a few species at high elevations in the tropics. Defined in a restricted sense, *Athyrium* comprises perhaps 100 species, but the number is unknown because of the varying circumscriptions *Athyrium* has received and because of the difficulty in delimiting species. By far the majority of species occurs in Japan, China, and the Himalayan region; probably fewer than 15 species occur in the New World. One species, *A. filix-femina,* is subcosmopolitan in distribution.

a. Rhizome creeping; fronds pinnate-pinnatifid .... 3. *A. skinneri*
aa. Rhizome erect; fronds 2-pinnate-pinnatifid or more.

b. Lowermost pinnae the largest or nearly so, not deflexed; pinnules distant, mostly 1–2 cm apart; ultimate segments serrately incised to laciniate at tip .... 1. *A. dombei*

bb. Lowermost several pairs of pinnae somewhat reduced and deflexed; pinnules crowded, mostly 4–6 mm apart; ultimate segments serrate to crenulate .... 2. *A. filix-femina*

1. **Athyrium dombei** Desv., Mém. Soc. Linn. Paris 6:266. 1827.

—Type: "habitat in Peruvia," collector not stated, probably *Dombey* (P, not found).

Athyrium arcuatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:278. 1849. —Type: Mexico, Puebla, Barranca de Chinautla, *Liebmann* [Liebm. Pl. Mex. 2303, Fl. Mex. 863] (C—2 sheets!).

Athyrium galeottii Fée, Gen. Fil. 187. 1852. —*Asplenium martensii* Mett., Abh. Senckenberg. Natur. Ges. 3:244. 1859 (not *Asplenium galeotii* Fée). —*Athyrium martensii* (Mett.) Moore, Ind. Fil. 186. 1860. (nom. superfl.). —Type: Mexico [Veracruz], "Pic d'Orizaba," *Galeotti 6269* (P? not found; isotype K!).

Athyrium pumilio Christ, Bull. Herb. Boissier (2)3:147. 1903. —Type: Mexico, Chiapas, near San Cristóbal, *Münch 91* (P! photo UC! isotype DS!).

Illustration: none found.

Fronds to 1.5 m long; stipe base tan to blackish, often with persistent, ascending scales; blade deltoid-lanceolate, 2-pinnate-pinnatifid to nearly 3-pinnate; lowermost pinnae the largest or nearly so, not deflexed; pinnae to 30 cm long, (usually 8–20 cm long), to 12 cm broad; pinnules distant, mostly 1–2 cm apart at base; ultimate segments serrately incised to often laciniate.

In Evergreen Cloud Forest, Pine-Oak-Arbutus; higher peaks of Central Plateau, s Sierra Madre; 2300–3000 m. Southern Mex. (Ver., Mich., Oax.), Guat., C.R.; S.A. (Ven. and Col. to Bol., nw Arg., s Braz.). Chiapas Collections: *GM 68* ? (DS); *G 229* (K, PH); *G 267* (K); *22041*; *22715*; *27215*; *31782*; *31813*; *32049*; *32059*; *40511*; *41267*; *41364*.

2. **Athyrium filix-femina** (L.) Roth, Tent. Fl. Germ. 3:65. 1799.

—*Polypodium filix-femina* L., Sp. Pl. 2:1090. 1753. —Type: typification uncertain; LINN 1251.39 and 1251.40 are this species.

Athyrium bourgaei Fourn., Mex. Pl. 1:102. 1872. —Type: Mexico, "in sylvis vallis Mexicensis pr. San Nicolas," *Bourgeau 1042* (P! photos UC! US! isotype K!).

Athyrium paucifrons C. Chr., Repert. Spec. Nov. Regni Veg. 9:371. 1911. —Type: Mexico, Michoacán, "à l'ouest du Zapote, près Morelia," *Arsène 25* (P; probable isotypes P—2 sheets !, *Arsène s.n.*).

Illustrations: Cronquist et al., Intermountain Fl. 1:214. 1972; Knobloch & Correll, Ferns Chih. 157. 1962.

Fronds mostly 1 m or less long; stipe base blackish, without persistent scales; blade mostly linear to linear-lanceolate; lowermost several pairs of pinnae progressively somewhat reduced and deflexed; pinnae mostly shorter than 10 (15) cm (ours); pinnules approximate, mostly 4–6 mm apart at base; ultimate segments serrate; n = 40 (U.S., Eur.).

Edges of marshes and wet slopes, also Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau; 1600–2900 m. Canada and Alas., U.S.; Mex. (Chih., Baja C.S., Hgo., Mich., Méx., Oax.); Afr., Eur., Asia. Chiapas Collections: *R 1060* (PH); *T 1282* (DS, US); *12918*; *15032*; *15074*; *15280*; *21998*; *25304*; *32702*; *41276*.

3. **Athyrium skinneri** (Baker) C. Chr., Ind. Fil. 146. 1905.

—*Asplenium skinneri* Baker, Syn. Fil. 226. 1867. —Type: Guatemala, apparently *Skinner s.n.* (K).

Illustration: **Fig. 12.**

Rhizome creeping, slender, 2–3 mm diam.; fronds 30–80 cm long, with stipe about as long as blade; blade deltoid-lanceolate, pinnate-pinnatifid; rachis slightly expanded at attachment of pinnae; pinnae 5–16 cm long, 1.5–3.0 cm broad, lanceolate; segments oblong, oblique, crenulate to serrate at margin, the basal basiscopic one often reduced or obsolete.

Stream banks and woods in Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak Forest; scattered in Central Depression and lower elevations of Sierra Madre near interface with Central Depression and Pacific Coastal Plain; 600–1100 m. Western and s Mex. (Sin., Nay., Cma., Jal., Mich., Méx., Gro., Oax.), Guat., Salv., Nic., C.R. Chiapas Collections: *22580*; *25629*; *27006*; *28313*; *37774*; *38491*; *38590*; *39053*; *40064*.

Baker described the rhizome as erect, grayish, 6–9 in. long; insofar as specimens I have seen, this is incorrect.

Athyrium palmense (Christ) Lellinger, from Mexico and Central America, is closely related to *A. skinneri*. It differs in having bipinnate-pinnatifid fronds and subflexuose rachises. I have seen specimens from Dgo., Nay., Jal., Mlos., Mich., and from Salv. and C.R.

13. AZOLLA

Azolla Lamarck, Encycl. Méth. 1:343. 1783. —Type: *A. filiculoides* Lam.

Minute floating plants, occasionally on mud; roots slender, unbranched; stems pinnately or subdichotomously branched, often concealed by imbricate leaves; leaves sessile, distichous, unequally bilobed, upper lobe green and floating, lower lobe hyaline, submersed, the blue-green alga *Anabaena azollae* in a cavity at the base of each leaf; sporangia (modified sori) infrequent; x = 22, 24.

About 10 species, 4 widely distributed in the New World (Svensen, 1944). Species identification is difficult, and for certain determination fertile specimens are needed. Neither of the two Chiapas collections are fertile, but it is relatively certain that they represent different taxa.

The affinities of *Azolla* are as obscure now as they were when the genus was first described—that is, the affinities are unknown.

References: Svensen, H. K. 1944. The New World species of *Azolla*. Amer. Fern J. 34:69–84; Pieterse, A. H. et al. 1977. A comparative study of *Azolla* in the Netherlands. Acta Bot. Neerl. 26:433–449.

Glochidia not septate; plants small, 0.5–1.0 cm diam.; leaves nearly orbicular, divaricate, small (0.5 mm long), nearly smooth, not closely imbricate . . . . 1. *A. caroliniana*
Glochidia many-septate; plants 1.0–1.5 cm diam.; upper leaves oblong, lobes 0.7 mm long, often papillate, closely imbricate . . . . 2. *A. mexicana*

1. **Azolla caroliniana** Willd., L. Sp. Pl., ed. 4, 5:541. 1810.

—Type: "Habitat in aquis Carolinae," *Richard s.n.* (B—Herb. Willd. 20260).
Illustration: **Fig. 13**; Svensen (1944:80).

Similar to *A. mexicana,* but plants small (0.5–1.0 cm diam.), the nearly orbicular, divaricate leaves small, 0.5 mm long, nearly smooth, not closely imbricate; glochidia not septate; $2n = 48$.

Floating in water; Central Depression, in Chiapas known from a single collection in flats with Savanna adjacent to Río San Pedro; 650 m. Widespread in e U.S., Gr. Antill.; s Mex. (Tab.); Nic., S.A. (Col., Peru, s Braz., Urug., n Arg.). Chiapas Collection: *38372.*

The sole Chiapas collection is sterile and so the identification is tentative. Nevertheless, it has noticeably smaller leaves than our specimen of *A. mexicana.*

2. **Azolla mexicana** Presl, Abh. Böhm. Ges. Wiss. (5)3:150. 1845.

—Type: Mexico, *Schiede & Deppe s.n.* In Linnaea 5:625, 1830, where the name is a nom. nud., the locality is given as "inter Serpillo et Estero" [Edo. Veracruz, near Tecoluta River, halfway between Veracruz and Tuxpan].
Illustrations: Svensen (1944:78, 80); Knobloch & Correll, Ferns Chih. 37, figs. 3–4. 1962.

Plants flattened, dichotomously branched, 1–2 cm diam.; upper leaf-lobes imbricate, rhombic-ovate, broadly rounded to obtuse at apex, ca. 0.7 mm long, the margin purplish-tinged or hyaline; microsporangia ca. 1 mm diam., globose, usually with 4 massulae; glochidia (retrorse hooks) of massulae (1) 2–6-septate; megasporocarps 0.25–0.3 mm long, pitted on basal portion.

Marshes; Gulf Coastal Plain, in Chiapas known from a single collection around Laguna de Catazaja, likely common in similar habitats of the Coastal Plain; 125 m. Widespread, B.C., w U.S., Mex. (Chih., Sin., Mich.), Hond., Nic., C.R.; S.A. (Fr. Gui., Ecu., Peru, Bol.). Chiapas Collection: *34927.*

Azolla mexicana is closely related to *A. filiculoides,* from which it differs in having septate glochidia and pitted megasporocarps (nonseptate glochidia and megasporocarps with raised hexagonal markings in *A. filiculoides*). Plants of *A. filiculoides* tend to be more elongate (2–6 cm long) and pinnately branched.

The sole Chiapas collection is sterile, so that the identification is somewhat uncertain. The range of *A. filiculoides* is similar to that of *A. mexicana* but extends further south into Argentina and Chile.

Species to Be Looked for in Chiapas

Azolla filiculoides Lam.—known from Alas., w U.S., Mex. (Chih., Pue., Mlos.), Guat., Nic.; S.A. (Col., Bol., Chile, Urug., Arg.); Haw. Differing from both *A. caroliniana* and *A. mexicana* in the plants elongate, frequently 2–6 cm long. From *A. caroliniana,* differing in the larger imbricate leaves (1 mm long). From *A. mexicana,* differing in the nonseptate glochidia.

14. BLECHNUM

Blechnum L., Sp. Pl. 2:1077. 1753. —Lectotype (first chosen by J. Smith, Hist. Fil. 300. 1875): *Blechnum occidentale* L.
Struthiopteris Weis, Plant. Crypt. Fl. Gott. 286. 1770. —Type: *Struthiopteris spicant* (L.) Weis [≡*Blechnum spicant* (L.) J. E. Smith].
Lomaria Willd., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 3:160. 1809. —Type: uncertain.

Terrestrial or hemiepiphytic; rhizome creeping to erect, occasionally scandent, sometimes forming a trunk, dictyostelic, scaly with nonclathrate scales; stipe with numerous vascular bundles; fronds usually pinnatifid or pinnate, monomorphic or dimorphic, often reddish when young; veins forked, free, the branches parallel; sori borne on commissural veins connecting main veins, parallel to costae; indusia attached to commissural vein and opening on side toward costa, firm, entire to erose to lacerate; sporangia crowded; spores bilateral, reniform to subglobose, with a winged perispore; $x = 28, 29, 31, 32, 33, 34, 36$.

About 200 species, distributed pantropically, with the majority of species in the Southern Hemisphere. A single species extends into temperate regions of the Northern Hemisphere. Most of the twelve Chiapas species are wide-ranging, extending into Central and South America.

References: Broadhurst, J. 1912. The genus *Struthiopteris* and its representatives in North America. Bull. Torrey Bot. Club 39:257–278, 357–385; Murillo, M. T. 1968. *Blechnum* subgenero *Blechnum* en Sur América, con especial referencia a las especies de Colombia. Nova Hedwigia 16:329–366.

a. Fronds monomorphic, the fertile ones not contracted (subg. *Blechnum*).
  b. Pinnae serrulate, articulate (sect. *Diafnia*) . . . . 10. *B. serrulatum*
  bb. Pinnae entire to crenulate, not articulate (sect. *Blechnum*).
    c. Fronds linear, dwindling at the base; all segments adnate . . . . 8. *B. polypodioides*
    cc. Fronds ovate or deltoid, truncate at the base; lower pinnae sessile or slightly stalked.

d. Lateral pinnae 10 pairs or more, diminishing into a pinnatifid apex .... 7. *B. occidentale*
dd. Lateral pinnae 1–4 (7) pairs, terminal pinna conform .... 5. *B. fraxineum*
aa. Fronds dimorphic, the fertile ones strongly contracted (subg. *Lomaria*).
e. Sterile fronds pinnatifid, all segments adnate.
f. Plants hemiepiphytic; rhizome scales bicolorous (sect. *Blechnidium*).
g. Sterile blade 15–25 cm broad, abruptly diminished at the base .... 2. *B. ensiforme*
gg. Sterile blade 3–8 cm broad, gradually dwindling to auriculiform lobes at the base .... 4. *B. fragile*
ff. Plants terrestrial, not climbing; rhizome scales concolorous (sect. *Lomaria*).
h. Sterile blade abruptly reduced at the base, with vestigial pinnae; vein spaces 6–8 per cm .... 1. *B. divergens*
hh. Sterile blade gradually reduced at the base, without vestigial pinnae; vein spaces 8–15 per cm.
i. Rhizome erect, without stolons, not forming colonies; sterile fronds to 10 cm broad, pinnae greater than 1 cm wide .... 6. *B. lehmannii*
ii. Rhizome creeping, stoloniferous, forming colonies; sterile fronds mostly less than 3 cm broad; pinnae less than 0.8 cm wide .... 11. *B. stoloniferum*
ee. Sterile fronds pinnate, the pinnae contracted at the base.
j. Bases of sterile pinnae cuneate to rounded to subcordate; costae below with scattered small scales; pinna margins entire, occasionally serrulate to erose.
k. Stipe dark purple; pinna margins conspicuously and irregularly erose .... 12. *B. varians*
kk. Stipe stramineous to tan; pinna margins usually entire .... 9. *B. schiedeanum*
jj. Bases of sterile pinnae subcordate; costae below copiously scaly; pinna margins regularly cartilaginously serrate .... 3. *B. falciforme*

1. **Blechnum divergens** (Kunze) Mett., Ann. Sci. Nat. Bot. (5)2:225. 1864.

—*Lomaria divergens* Kunze, Linnaea 9:57. 1834. —Type: Peru, Pampayaco, *Poeppig* [Diar. 1141] (LZ, destroyed).

Lomaria exaltata Fée, Mém. Fam. Foug. 11:10, pl. 3. 1866. —*Struthiopteris exaltata* (Fée) Broadh., Bull. Torrey Bot. Club 39:264. 1912. —*Blechnum exaltatum* (Fée) Duek, Adansonia 11:727. 1971. —Type: Guadeloupe, 1861, *L'Herminier s.n.* (P! isotypes P!—3 sheets).

Illustration: see under synonymy above.

Terrestrial; rhizome ascending, subarborescent, 1–2 cm thick; fronds dimorphic, the sterile 30–90 cm long, with stipe 20–30 cm long; sterile blade abruptly reduced below, with 1–5 contiguous, vestigial pinnae, 22–47 cm long, 12–24 cm wide, terminal segment 5–9 cm long; pinnae 9–18 pairs, narrowly triangular to oblong, straight or upper ones slightly upcurved, apex acute, 6–12 cm long, 1.5–3 cm broad; leaf tissue rigid-herbaceous, punctate, epaleate; sporophylls 44–90 cm long, taller than sterile fronds, with stipe 24–40 cm long, abruptly reduced at base with vestigial pinnae; fertile pinnae 12–22 pairs, 11–14 cm long, 3–4 mm wide.

In Montane Rain Forest, less often Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1700–2300 m. Southern Mex. (Oax.), Hond., Nic., C.R., Pan.; S.A. (Ven. to Bol., s Braz.); Antill. except Jam. Chiapas Collections: *G 451*, pt. (YU); *Z 378* (DS); *21456*; *21512*; *23215*; *31854?*; *32391*; *33698*.

The sole Chiapas collection from the Sierra Madre (*31854*) is quite atypical, being very thin-textured, unusually small, and with a dark purplish, shiny stipe; it possibly represents an undescribed variety or even species. In the sum of its characters, it varies toward *B. lehmannii* and even *B. stoloniferum*.

2. **Blechnum ensiforme** (Liebm.) C. Chr., Ind. Fil. 153. 1905.

—*Lomaria ensiformis* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:234. 1849. —*Struthiopteris ensiformis* (Liebm.) Maxon, Contr. U.S. Natl. Herb. 13:17. 1909. —Type: Mexico, Oaxaca, Distr. Chinantla, Teotalcingo, *Liebmann* [Liebm. Pl. Mex. 2342] (C—2 folio sheets!). I choose the sheet with both fertile and sterile fronds as lectotype.

Illustration: **Fig. 14.**

Hemiepiphytes; rhizome long-creeping, 0.5–1.0 mm diam. clothed with scales 5–10 mm long, the scales maroon to brown, with a black median line; fronds dimorphic, the sterile 90–100 cm long, with stipe 20–28 cm long; sterile blade 40–68 cm long, 25–35 cm broad, abruptly reduced at base, terminal segment 5–8 cm long; pinnae 22–28 pairs, narrowly oblong to linear, straight, 16–18 cm long, 12–17 mm broad, the bases dilated, lower ones 2–3 cm apart, adnate, appearing free or connected to adjacent pinnae by a very narrow wing, margins entire; leaf tissue rigid-herbaceous, without scales; sporophylls 60–70 cm long, with stipe 20–28 cm long, the pinnae 20–30 pairs, 10–20 cm long, 2–4 mm broad; indusia entire, not becoming lacerate.

Climbing at bases of trees in Montane Rain Forest, Pine-Oak-Liquidambar Forest; widely scattered localities in Central Plateau, s Sierra Madre, and Northern Highlands (Jitotol Ridge); 1300–2200 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A.? Chiapas Collections: *GM 157* (DS, US); *P 6741* (NY, UC, US); *EM 4192* (MEXU, NY); *EM 2913* (K, MEXU, NY, US); *9756*; *15015*; *15392*; *22662*; *31708*; *32134*; *32430*; *35109*; *38809*.

3. **Blechnum falciforme** (Liebm.) C. Chr., Ind. Fil. 154. 1905.

—*Lomaria falciformis* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:234. 1849. —*Struthiopteris falciformis* (Liebm.) Broadh., Bull. Torrey Bot. Club 39:365. 1912. —Syntypes: Mexico. Puebla, Chinautla, *Liebmann* [Liebm. Pl. Mex. 2307, Fl. Mex. 266 and 267] (C!); Oaxaca, Cerro de Sempoaltepec, *Liebmann* [Liebm. Pl. Mex. 2343, Fl. Mex. 775] (C—folio!). I choose Liebm. Pl. Mex. 2343 as lectotype.

Lomaria deflexa Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:236. 1849. —Type: Mexico, Oaxaca, "inter Totontepec et Trapiche de la Concepcion" [specimen], *Liebmann* (Liebm. Pl. Mex. 2341, Fl. Mex. 770] (C—folio!).

Illustration: **Fig. 15.**

Terrestrial; rhizome stout, erect; rhizome and stipe scales brown to blackish; fronds dimorphic, the sterile 70–150 cm long, with stipes 30–80 cm long; blade pinnate, to 75 cm long, 50 cm broad, lower pinnae not reduced; pinnae 18–32 pairs, 12–25 cm long, margins serrulate, cordate to subcordate at base, lower pinnae short-stalked; leaf tissue coriaceous; costae and veins below persistently scaly; indusia erose to usually strongly lacerate.

In Evergreen Cloud Forest, less often Montane Rain Forest; relatively common on higher peaks of Central Plateau, s Sierra Madre, uncommon in Northern Highlands (Jitotol Ridge); (1900) 2700–3000 m. Southern Mex. (Méx., Pue., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col., Gal.). Chiapas Collections: *P 6739* (NY, UC, US); *L&S 9928* (UC, US); *GM s.n.* (DS); *GM 27* (DS, US); *JTM 1238* (US); *G 451*, pt. (K, YU); *14033*; *21463*; *21990*; *22050*; *22665*; *22807*; *31778*.

4. **Blechnum fragile** (Liebm.) Morton & Lellinger, Amer. Fern J. 57:68. 1967.

—*Lomaria fragilis* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:232. 1849. —Syntypes: Mexico. Veracruz. "Baranca de Huitamalco," *Liebmann* [Liebm. Pl. Mex. 2321, Fl. Mex. 772 and 773, folios; also Fl. Mex. 269] (C!); "Baranca de Mirador," *Liebmann* [Liebm. Pl. Mex. 2344, Fl. Mex. 774] (C—folio!). I choose Fl. Mex. 773 as lectotype.

Osmunda polypodioides Swartz, Prodr. Veg. Ind. Occ. 127. 1788. —*Blechnum onocleoides* Swartz, J. Bot. (Schrader) 1800(2):75. "1801" [1802] (illegit.) —*Lomaria polypodioides* (Swartz) Desv., Mém. Soc. Linn. Paris 6:288. 1827 (non Gaud., 1825). —*Lomària onocleoides* Spreng., L. Syst. Veg., ed. 4, 4:62. 1827. —*Blechnum polypodioides* (Swartz) Kuhn, Fil. Afr. 92. 1868 (not Raddi, 1819). —Type: Jamaica, *Swartz s.n.* (presumably S).

Lomaria mexicana Fée, Mém. Fam. Foug. 8:70. 1857. — Syntypes: Mexico, *Galeotti 6465*; "Totutla, Mirador, Huatusco," *Schaffner 100* (P?).

Illustrations: Fée, Mém. Fam. Foug. 7:pl. 9, fig. 1. 1857 (as *Lomaria decrescens* Fée); Hooker, Sp. Fil. 3:pl. 146. 1860.

Plants hemiepiphytic; rhizome wide-creeping, often several meters above ground, 0.5–1 (2) cm thick, the scales linear, 7–14 mm long, dark brown, usually with a black median line; fronds dimorphic, the sterile 25–95 cm long, 4–15 cm broad, with stipe 6–28 cm long, linear-lanceolate, usually gradually tapering at both ends, the lower usually contiguous, pinnae becoming triangular or semicircular; pinnae (sterile fronds) 25–75 pairs, falcate, apex acute, widest at base, 2.2–8 cm long, 9–12 mm wide, margins entire; leaf tissue without scales; veins below usually darkened; sporophylls 20–70 cm long, 6–16 cm broad, with stipe 8–24 cm long, the blade abruptly reduced at base, often with a few vestigial pinnae; fertile pinnae 2–3 mm wide, not dilated at base; indusia entire; $n = 29$ (Jam.).

Vine on tree trunks, in Lower Montane and Montane rain forests; uncommon and widely scattered in Northern Highlands, Central Plateau; 900–1700 m. Southern Mex. (Ver., Oax.), Guat., Nic., C.R., Pan.; S.A. (Col.); Gr. Antill. Chiapas Collections: *GM 22bis* (DS, US); *G 374* (K, NY, PH); *23120*; *31516*; *32220*; *32602*; *35129*.

5. **Blechnum fraxineum** Willd., L. Sp. Pl., ed. 4, 5:413. 1810.

—Type: Venezuela, "Habitat ad Caracas," *Bredemeyer s.n.* (B—Herb. Willd. 20044; photo GH).

Blechnum longifolium Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:413. 1810 (not Cav., 1802). —Type: "Habitat in America calidiore, prope Caripe," *Humboldt & Bonpland s.n.* [464] (B—Herb. Willd. 20045; photo GH).

Blechnum subdimorphum Copel., Univ. Calif. Publ. Bot. 19:288, pl. 38. 1941. —Lectotype (chosen by Murillo, 1968:358): Mexico, Veracruz, Cordova, *Copeland Mex. Ferns No. 50* (MICH ?, photo GH; isolectotypes P! UC!).

For additional synonymy, see Murillo (1968:358).

Illustrations: Bot. Mag. 55:pl. 2818. 1828; Lowe, Ferns 4:pl. 37. 1859; Hooker, Sp. Fil. 3:pl. 154. 1860; Murillo (1968:pls. 133–134).

Terrestrial; rhizome creeping to suberect; fronds monomorphic, mostly 15–60 cm long, 3–25 cm broad, stipe about as long as blade; blade pinnate throughout, with a terminal pinna similar to lateral pinnae, without reduced pinnae below; pinnae 1–6, to ca. 15 cm long, mostly 1–2 cm broad, falcate, gradually attenuate from a subcordate base, lower pinnae short-stipitate; leaf tissue chartaceous to subcoriaceous.

Along streams, edges of woods, in Tropical, Lower Montane, and Montane rain forests; uncommon and widely scattered in Northern and Eastern highlands, Pacific and Gulf coastal plains; 300–800 m. Southern Mex. (Gro., Oax., Ver.), Bel., Guat., Hond., Nic., C.R.; S.A. (Sur., Ven. and Col. to Bol., Arg., Parag., Braz.); Antill., Trin. Chiapas Collections: *EM 188* (MEXU); *EM 3612* (MEXU, US); *P 6738* (NY, UC, US); *C&D 169* (US); *G 415* (NY); *G 277a* (K); *R 1079* (PH); *31587*; *32982*; *42005*.

Hybrids between this species and *B. occidentale* almost certainly occur in Chiapas (*34096*, from Eastern Highlands near Guatemala border). This hybrid (as *B. antillanum* Proctor) has also been reported from Jamaica and Trinidad (Walker, Trans. Roy. Soc. Edinburgh 66:167–237. 1966; 69:109–135. 1973) and from the Lesser Antilles (Proctor, Fl. L. Antill. 2:156. 1977), and Walker found irregular meiosis in one plant. The Chiapas specimen has abortive spores.

6. **Blechnum lehmannii** Hieron., Bot. Jahrb. Syst. 34:473. 1904.

—Type: Colombia, Río Timbiqui, *Lehmann 8928* (B; isotypes K—3 sheets!).

Struthiopteris maxonii Broadh., Bull. Torrey Bot. Club 39:268, pl. 22. 1912. —*Blechnum maxonii* (Broadh.) C. Chr., Ind. Fil. Suppl. I:16. 1913. —Type: Panama, Chiriquí, Cerro de la Horqueta, *Maxon 5415* (US).

Illustration: see under synonymy above.

Terrestrial; rhizome ascending to erect, elongate, clothed with numerous dark brown scales at apex; fronds dimorphic, the sterile 18–38 cm long, with stipe 1.5–6 cm long; blade 17–35 cm long, 3–5 cm wide, pinnatisect, gradually reduced at base and towards apex, terminal pinna 1–4 cm long, basal segments dwindling to semicircular lobes; pinnae 15–26 pairs, falcate, apex rounded to subacute, base somewhat dilated, 2–3 cm long, 8–14 mm broad; leaf tissue rigid-herbaceous, punctate, epaleate; sporophylls 25–28 cm long, abruptly reduced below with a few vestigial pinnae, stipe 1–5 cm long, pinnae 14–18 pairs, 2–4 cm long, ca. 2 mm wide; $n = 198$ (Hond.).

In Montane Rain Forest; rare in s Sierra Madre; 1900 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Col., and probably Braz.). Chiapas Collection: *22604*.

7. **Blechnum occidentale** L., Sp. Pl. 2:1077. 1753 (as *B. orientale* L., a transposition of names corrected in ed. 2 of Sp. Pl., 1763).

—Type: uncertain; LINN 1247.1 is this species but, according to Jackson (1912), was added to LINN after 1755. Petiver and Morison illustrations also cited.

Blechnum glandulosum Link, Enum. Plant. Hort. Reg. Bot. Berol. Alt. 2:462. 1822. —Type: described from cultivated material, said to have originated from Brazil, collected by *Otto* (Kaulfuss, Enum. Fil. 161. 1824) (presumably B).

Blechnum aduncum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:237. 1849. —Type: Mexico, Veracruz, "S. Antonio Huatusco," *Liebmann* [Liebm. Pl. Mex. 2324, Fl. Mex. 273 and 274] (C!). I choose Fi. Mex. 273 as lectotype.

Blechnum falciculatum Presl, Epim. Bot. 106. "1849" [1851]. —Lectotype (chosen by Murillo, 1968:353): Mexico, Veracruz, "Jalapa, Zacuapan y Mirador," *Galeotti 6397* (BR, photos BM, GH, US; isolectotype K!).

Illustrations: Wherry, Southern Fern Guide 157. 1964; Nat. Pflanzenf. 1(4):246. 1899; Vareschi, Fl. Venez. pl. 98. 1969; Matuda, Anales Inst. Biol. Univ. Nac. México 27:139. 1956; Murillo (1968:pls. 130, 131).

Terrestrial; rhizome erect or suberect; fronds monomorphic, mostly 30–100 cm long, blade mostly 20–50 cm long, 6–25 cm broad, pinnate at base or in basal half, pinnatisect distally, upper segments gradually reduced into a pinnatifid apex; pinnae falcate, attenuate from middle or from the cordate or subcordate base, 8–20 mm broad, basal ones usually short-stalked and deflexed, upper ones fully adnate; leaf tissue herbaceous to subcoriaceous, glabrous or nearly so beneath; n = 62 (Fla., Oax., Chis., Jam.), $2n$ = 92, 124 (Gal.).

Rocky slopes, wet banks, roadsides, and other semidisturbed areas in Lower Montane and Montane rain forests, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Seasonal Evergreen Forest, and Tropical Deciduous Forest; very common in Northern and Eastern highlands, Central Plateau, Central Depression, and Sierra Madre; 450–2700 m. Mexico (Ver., Mlos., Jal., Mich., Gro., Méx., Pue., Oax.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. and Ven. to n Arg., Parag., Braz., Chile); Fla., Antill. Chiapas Collections: *G 277* (K, NY, US); *G 278* (PH); *C 333* (DS); *GM 56* (DS); *A 1313* (DS, NY, UC); *T&L 41125* (DS); *H&S 20181* (US); *EM 232* (MEXU); *X&S X-324* (US); *EM 5359* (MEXU); *EM 2591* (MEXU); *EM 17890* (MEXU, US); *C&D 93* (US); *C&D 162* (US); *9328*; *21722*; *21843*; *22266*; *22351*; *22567*; *22601*; *23168*; *23310*; *24044*; *25054*; *25112*; *25229*; *27031*; *27218*; *27919*; *28154*; *28479*; *29103*; *31526*; *31565*; *31704*; *31937*; *32022*; *32536*; *32540*; *32566*; *33047*; *33783*; *34626*; *34701*; *37688*; *38010*; *38420*; *38585*; *39054*; *40056*; *42505*.

Blechnum occidentale is a highly variable and widespread species. Those forms that have a small, somewhat narrower blade and pubescent rachis have been called *B. glandulosum* [or *B. occidentale* var. *glandulosum* (Link) Proctor]. The earliest name at varietal rank appears to be *B. occidentale* var. *puberulum* Sod. (Rec. Crypt. Vasc. 32. 1882). Others have considered this variant as a mere form [*B. occidentale* forma *pubirhachis* Rosenst., Hedwigia 46:94. 1906]. This smaller, hairy form seems to occur throughout the range of the species, in Chiapas perhaps more often at higher elevations.

Blechnum occidentale hybridizes with *B. fraxineum* (which see) and also *B. polypodioides*. Hybrids with the latter have not yet been found in Chiapas.

8. **Blechnum polypodioides** Raddi, Opusc. Sci. 3:294. 1819.

—Type: Brazil, Corcovado. *Raddi s.n.*

Asplenium blechnoides Lag. ex Swartz, Syn. Fil. 76. 1806. —*Blechnum unilaterale* Swartz, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 4:79, pl. 3, fig. 1. 1810 (nom. superf., illegit.). —*Blechnum blechnoides* (Lag. ex Swartz) C. Chr., Ind. Fil. 151. 1905 (not Keys., 1873). —Type: "Peruvia," collector not stated, Née? (presumably S).

Blechnum scabrum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:236. 1849. —Type: Mexico, Oaxaca, Chinantla, Teotalcingo, *Liebmann* [Liebm. Pl. Mex. 2305, Fl. Mex. 271 and 272] (C!). I choose 272 as lectotype.

Blechnum angustifrons Fée, Mém. Fam. Foug. 7:25, pl. 9, fig. 2. 1857. —Syntypes: Mexico, *Galeotti 6284* and *6440* (presumably P).

Illustrations: Raddi, Pl. Bras. 1:pl. 60, fig. 2. 1825; Kunze, Farrnkr. pl. 58. 1843; Murillo (1968:pl. 126); see also under synonyms above.

Terrestrial; rhizome erect or upcurved, 0.5–1.5 cm thick; fronds monomorphic, 20–70 cm long, stipe short; blade linear, tapering evenly in both directions from middle, 15–50 cm long, 3–9 cm broad, pinnate at base, pinnatisect distally; basal pinnae distant, irregularly triangular, 2–10 mm long, sursumcurrent, subauriculate below; middle pinnae narrowly oblong or linear, 1.5–5 cm long, 4–7 mm broad at middle, meeting at their dilated bases; leaf tissue thin-herbaceous, mostly glabrous; n = 62 (Jam., Gal.).

Wet roadbanks and semi-disturbed areas adjacent to Pine-Oak-Liquidambar Forest, Montane Rain Forest; widely scattered in Sierra Madre, Northern Highlands; 800–1400 m. Southern Mex. (Oax., Ver.), Bel., Hond., Salv., Nic., C.R., Pan.; S.A. (Guy., Col. to Bol., Parag., Arg., s Braz.); Antill., Trin. Chiapas Collections: *GM s.n.* (UC); *GM 65* (DS); *P 6740* (NY, UC, US); *C&D 98* (US); *21865*; *25148*; *31611*; *32486*; *32541*; *38540*; *39133*.

Blechnum confluens Schlecht. & Cham., treated by Murillo (1968) as a distinct species, seems to me indistinguishable from *B. polypodioides*.

9. **Blechnum schiedeanum** (Schlecht. ex Presl) Hieron., Hedwigia 47:239. 1908.

—*Lomaria schiedeana* Schlecht. ex Presl, Tent. Pterid. 143. 1836. —*Lomaria spectabilis* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:235. 1849 (nom. superfl.). —Type: Mexico, Veracruz, Jalapa, *Schiede* [781] (isotypes B, HAL, photo K!; fragments NY).

Lomaria acrodonta Fée, Mém. Fam. Foug. 8:70. 1857. —Type: Mexico [Veracruz], "a Huatusco et Totutla," *Schaffner 102* (P?).

Illustration: Rovirosa, Pterid. Sur Mex. pl. 22. 1909 (as *Lomaria procera*).

Terrestrial; rhizome erect, the apex and stipe base clothed with scales 2.5–3 cm long, 5–10 mm wide, tan; fronds dimorphic, the sterile 1.1–2 m long, with stipe 70–80 cm long; blade pinnate, lower pinnae not reduced, pinnae 18–30 pairs, margins entire to finely serrate, apex serrate, rounded to subcordate at base, to 36 cm long, 3 cm broad; costae below finely fibrillose, glabrescent; sporophylls 50–160 cm long, with pinnae 15–26 pairs, 8–20 cm long, 3–5 mm broad, with a sterile tip 2–5 mm long, ± stipitate.

In Montane Rain Forest, infrequently Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; scattered in s Sierra Madre, Northern Highlands, Central Plateau; 800–2300 m. Southern Mex. (Ver., Oax.), Guat., Nic. Chiapas Collections: *GM 97* (DS); *R 846* (NY, PH); *G 389* (K, YU); *T&L 41639* (DS); *21889*; *22646*; *23151*; *31636*; *32354*; *38854*; *40885*.

Blechnum schiedeanum is closely related to *B. fal-*

ciforme, and several collections are difficult to place in one or the other (e.g., *23111*; *32447*; *32655*; *33535*). The main differences are given in the key. In addition, *B. falciforme* seems to grow at higher elevations than *B. schiedeanum*. I have not found the character of the shape of pinna base (Broadhurst, 1912) to be especially helpful in distinguishing the two species; specimens of both species may have subcordate pinna bases.

10. **Blechnum serrulatum** L. C. Richard, Actes Soc. Hist. Nat. Paris 1:114. 1792 (not seen).

—TYPE: Florida, *Thaillier s.n.* (P?), according to Murillo (1968); French Guiana, *LeBlond s.n.* (P?), according to Proctor (Fl. L. Antill. 2:154. 1977).

For additional synonymy, see Murillo (1968).

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 23. 1909; Wherry, Southern Fern Guide 155. 1964; Eaton, Ferns N. Amer. 1:pl. 19. 1878.

Terrestrial; rhizome stout, up to ca. 1 cm diam., creeping; fronds monomorphic, up to ca. 1 m long; blade pinnate, with a terminal pinna; pinnae to ca. 15 cm long, 1.5 cm broad, serrulate-margined, articulate at base; leaf tissue rigid, chartaceous to subcoriaceous, minutely scaly along costae below, the scales tan, ovate.

In swamps and boggy ground at lower elevations; uncommon, known from a collection just south of Bachajón and also from Popal, near Río Tonalá; 900 m. Southern Mex. (Ver., Tab.), Hond., Nic., Pan.; S.A. (Col. to Fr. Gui., Braz., NE Arg.); Fla., Antill., Trin. CHIAPAS COLLECTIONS: *Mi 8497*; *22219*.

Possibly not distinct from *B. indicum* Burm., which occurs in the Old World in Malesia and tropical Australia.

11. **Blechnum stoloniferum** (Mett. ex Fourn.) C. Chr., Ind. Fil. 154. 1905.

—*Lomaria stolonifera* Mett. ex Fourn., Mex. Pl. 1:113. 1872. —*Struthiopteris stolonifera* (Mett. ex Fourn.) Broadh., Bull. Torrey Bot. Club 39:277. 1912. —SYNTYPES: Mexico, Veracruz, Orizaba, *Müller 61* and *1491* (Herb. Meissn.) (isosyntype of *Müller 1491* at K!)

Lomaria ghiesbreghtii Baker *in* Hook. & Bak., Syn. Fil., ed. 2, 481. 1874.—*Blechnum ghiesbreghtii* (Baker) C. Chr., Ind. Fil. 154. 1905. —TYPE: Mexico, Chiapas, *Ghiesbreght 207* (K!; isotypes NY! PH!).

ILLUSTRATION: Knobloch & Correll, Ferns Chih. 134. 1962.

Terrestrial, forming large colonies; rhizome creeping and stoloniferous, 1–2 mm thick; fronds dimorphic, the sterile 11–20 cm long, with stipe 0.5–4 cm long; sterile blade pinnatifid, gradually reduced toward base, the segments 16–22 pairs, triangular-falcate to oblong-falcate, apex rounded or obtuse, base more or less dilated, 6–18 mm long, 4–5 mm wide, margins entire; leaf tissue herbaceous, epaleate; sporophylls taller, 25–28 cm long, with stipe 9–13 cm long, abruptly reduced at base with slight indications of vestigial pinnae; fertile pinnae 12–19 pairs, 1–2 cm long, 2–3 mm broad.

In Evergreen Cloud Forest; uncommon on higher peaks of Central Plateau and in s Sierra Madre; 2600–2800 m. Mexico (Chih., Méx., Hgo., Ver., Oax.), Guat. CHIAPAS COLLECTIONS: *GM 22* (DS, P, US); *G 207* (K, NY, PH); *22076*; *31779*; *32053*; *40507*.

12. **Blechnum varians** (Fourn.) C. Chr., Ind. Fil. 161. 1905.

—*Lomaria varians* Fourn., Mex. Pl. 1:113. 1872. —SYNTYPES: Mexico, Veracruz, Orizaba, *Botteri 1420* in Herb. Van Heurck (not seen); "in valle Cordovensi," *Bourgeau 1826* (P—6 sheets!).

ILLUSTRATION: **Fig. 16.**

Similar to *B. schiedeanum*, differing from that species in the stipe and rachis dark purplish black, shining; costae and rachis below with very few scales or scales absent.

In Pine-Oak-Liquidambar Forest; rare in N Sierra Madre; 1400 m. Southern Mex. (Gro., Ver.), Hond. CHIAPAS COLLECTION: *25131*.

This appears to be a rather rare species throughout its range, judging from the limited number of collections in herbaria.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Blechnum danaeaceum (Kunze) C. Chr. —known only from a few collections from Veracruz. Apparently distinguished by the fronds dimorphic, pinnate, with 2–5 pairs of lateral, cuspidate pinnae on sterile fronds. This seems to be closely related to *B. schiedeanum*, but the collections at hand are so few that I am uncertain. Syntypes are *Leibold 121* and *122* (isosyntype of no. *121* in P!).

15. BOLBITIS

Bolbitis Schott, Gen. Fil. pl. 14, 1834. —LECTOTYPE (first chosen by Christensen, Ind. Fil. xxvi. 1906): *Acrostichum serratifolium* Kaulf. [≡*Bolbitis serratifolia* (Kaulf.) Schott].

For additional synonymy, see Hennipman (1977:123).

Plants terrestrial or hemiepiphytic; rhizome creeping, dictyostelic, bearing lanceolate, brownish scales; stipe with numerous vascular bundles, sparsely scaly; blade entire to pinnate or bipinnatifid, glabrous; venation usually evident, with regular or irregular areoles, these with or without included veinlets; fertile fronds often somewhat longer-stalked than the sterile, blade contracted, bearing sporangia over lower surface (acrostichoid) or sometimes partly sterile, without indusia or paraphyses; spores bilateral, with a thick, often-winged perispore; $x = 41$.

Pantropical, with 14 species scattered in the Neotropics (s Mex. to NW Arg., Parag., and s Braz., Antill.). The number of Old World species is larger, about 30. The taxonomy of *Bolbitis* has been recently revised by Hennipman (1977). Seven species are known from southern Mexico, two of these endemic; six of the seven occur or did occur in Chiapas. *Bolbitis* is primarily a genus of low elevations in Chiapas, in very wet rain forest. With the exception of *B. portoricensis*, all of the species are uncommon or rare. The affinities of *Bolbitis* are seemingly with the lomariopsoid ferns (including *Lomariopsis* and *Elaphoglossum*), but beyond that uncertain.

The key to species is modified from the key in Hennipman (1977).

REFERENCE: HENNIPMAN, E. 1977. A monograph of the fern genus *Bolbitis* (Lomariopsidaceae). Leiden University Press (Leiden Bot. Ser. no. 2). xii + 331 pp., 12 pl., 87 figs.

a. Rhizome scale margins denticulate; tertiary veins of sterile pinnae prominent throughout; high-climbing hemi-epiphyte .... 2. *B. bernoullii*
aa. Rhizome scale margins entire; tertiary veins prominent near costa or near secondary veins only; terrestrial.
  b. Fronds pinnatifid or pinnate (rarely entire in *B. pergamentacea*), if pinnate, with terminal segment usually conform to pinnae, rarely narrowly triangular and much shorter than remainder of blade.
    c. Fronds pinnatifid, with a subterminal bulbil; most areoles along margin with usually one included free vein .... 3. *B. hastata*
    cc. Fronds pinnate, with bulbils absent or inconspicuous.
      d. Areoles without recurrent included free veins, excurrent free veins present or not; blade with 9–13 (30) pinnae; perine of spores undulate .... 6. *B. serratifolia*
      dd. Areoles with both recurrent and excurrent included free veins; blade with mostly 1–3 pinnae; perine of spores cristate .... 4. *B. pergamentacea*
  bb. Fronds pinnate with terminal segment triangular and often longer than remainder of blade.
    e. Areoles without included free veins or with but few, short, simple, recurrent, included, free veins; frond apex never flagelloid, without bulbils .... 1. *B. aliena*
    ee. Venation pattern with many recurrent (and excurrent) included free veins that are in part l-forked; frond apex often flagelloid, with bulbils present .... 5. *B. portoricensis*

1. **Bolbitis aliena** (Swartz) Alston, Kew Bull. 1932:310.

—*Acrostichum alienum* Swartz, J. Bot. (Schrader) 1800(2):13. "1801" [1802]. —*Leptochilus alienus* (Swartz) C. Chr., Bot. Tidsskr. 26:285. 1904. —TYPE: Jamaica, collector not stated (S; isotype S).

For additional synonymy, see Hennipman (1977:132).

ILLUSTRATION: **Fig. 17**; Karsten, Fl. Columb. 1:pl. 57. 1860 [as *Chrysodium maracaybense* Karst.]; Hennipman (1977:133).

Plants terrestrial, not climbing; rhizome short-creeping, ca. 3–7 mm diam., tortuous, bearing brown, entire, lanceolate scales; fronds few, dimorphic, the sterile ca. (25) 35–65 (90) cm long, with stramineous (tan toward base) stipe one-third to nearly as long as blade, sparsely scaly; sterile blade deltoid, ca. 15–30 cm broad, not flagelloid or proliferous at apex, lowermost 1 (2) pair(s) of pinnae free or nearly free, subentire to more often lobed about halfway to costa, basal lobes shortened; subsequent pinnae increasingly adnate, decurrent and confluent to large pinnatifid apex; fertile fronds ± same length as sterile but with longer stipes, the pinnae much narrower, entire to sometimes the lowermost pair(s) lobed; veins of sterile blades areolate, areoles relatively large, hexagonal, without included veinlets or with only few, short, simple, free veins; sterile leaf tissue glabrous, thin, chartaceous, fertile thick-herbaceous; sporangia acrostichoid, but with a continuous fringe of sterile leaf tissue 1–2 mm wide around margin; $n = 82$ (Jam.).

Wet limestone ledges in deep Lower Montane Rain Forest; uncommon, known from two localities in Northern Highlands; 700–1000 m. Southern Mex. (Ver.), Hond., Nic.; S.A. (Ven. and Col. to Bol.); Antill., Trin. CHIAPAS COLLECTIONS: *G 409* (K, not seen, cited by Hennipman, 1977:134); *21621*; *22483*; *30866*.

2. **Bolbitis bernoullii** (Kuhn ex Christ) Ching *in* C. Chr., Ind. Fil. Suppl. III:47. 1934.

—*Acrostichum bernoullii* Kuhn ex Christ, Bull. Soc. Roy. Bot. Belg. 35:244. 1896. —*Leptochilus bernoullii* (Kuhn ex Christ) C. Chr., Bot. Tidsskr. 26:296, fig. 8. 1904. —LECTOTYPE: (chosen by Christensen, 1904, op. cit.): Guatemala, "entre Escamillas et Palohucco [Palahueco], Costa Grande," *Bernoulli s.n.* (BR? isotype B; fragm. BM! NY).

Gymnopteris tuerckheimii Christ, Bull. Herb. Boissier (2)6:290. 1906. —*Leptochilus tuerckheimii* (Christ) C. Chr., Ind. Fil. Suppl. I:48. 1913. —TYPE: Guatemala, Alta Verapaz, Cubilquitz, *v. Tuerckheim 8831* (US).

Gymnopteris donnell-smithii Christ, Bull. Herb. Boissier (2)6:289. 1906. —*Leptochilus donnell-smithii* (Christ) C. Chr., Ind. Fil. Suppl. I:48. 1913. —*Bolbitis donnell-smithii* (Christ) Ching *in* C. Chr., Ind. Fil. Suppl. III:48. 1934. —TYPE: Guatemala, Alta Verapaz, Cubilquitz, *v. Tuerckheim 8830* (US).

ILLUSTRATIONS: see under *Leptochilus bernoullii*, cited above; Hennipman (1977:260).

Plants hemiepiphytic; rhizome long-creeping, climbing, densely clothed with castaneous, denticulate, linear-lanceolate scales; fronds dimorphic, the sterile to ca. 85 cm long, with stramineous stipe about one-third as long as blade, sparsely scaly; sterile blade deltoid-lanceolate, to ca. 30 cm broad, not flagelloid or proliferous at apex, 1-pinnate with a ± conform terminal pinna; pinnae numerous, to ca. 15 pairs, cuneate at base, acuminate at apex, mostly 1.5–2.5 (3.0) cm broad, short-stalked (not decurrent or adnate), crenate along margin, crenations broad (ca. 5 mm); fertile blade with entire, lanceolate, short-stalked pinnae to ca. 12 cm long, 1 cm broad, acrostichoid; veins of sterile blade forming irregular areoles, subcostal areoles with (1) 2–3 excurrent included free veins; leaf tissue glabrous, chartaceous.

Vine in Lower Montane (and Tropical?) Rain Forest; uncommon in s Sierra Madre, Northern Highlands; ca. 500 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R.; S.A. (Col., Ecu.). CHIAPAS COLLECTIONS: *EM 18605* (MEXU, US); *P 7246* (BM, UC, US); *32796*.

3. **Bolbitis hastata** (Fourn.) Hennipman, Amer. Fern J. 65:30. 1975.

—*Acrostichum hastatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:172. 1849 (not Thunb., 1784). —*Gymnopteris hastata* Fourn., Mex. Pl. 1:70. 1872. —*Leptochilus liebmannii* Maxon, Proc. Biol. Soc. Wash. 43:86. 1930. —*Bolbitis liebmannii* (Maxon) C. Chr., Ind. Fil. Suppl. III. 49. 1934. —TYPE: Mexico, Veracruz, Arroyo de Isapa, "Baranca de Jovo," near

Sta. María Tlapacoyo, *Liebmann* [Liebm. Pl. Mex. 2446, Fl. Mex. 37, 39, 668 (folio)] (C! isotypes B, BM! K! US; photo UC!).

ILLUSTRATION: Hennipman (1977:244).

Plants terrestrial; rhizome ?; fronds dimorphic, the sterile 45–65 cm long, with stipe 15–20 cm long; sterile blade deltoid, deeply pinnatifid, with a subterminal bulbil, ca. 45 cm long, 25 cm broad, decurrent at base, with ca. 3–5 pairs of lanceolate segments, largest ca. 25 cm long, 4–5 cm broad, strongly ascending, subentire to irregularly repand at margin; fertile blade acrostichoid, ca. 15 cm long, 10 cm broad (with stipe about twice as long), shaped like the sterile but much smaller and with segments contracted; veins areolate, with usually 1 included, pendulous, free vein per areole.

Exact locality and habitat data not known, but probably low elevation rain forest. Endemic to s Mex. (Ver., Oax.). CHIAPAS COLLECTION: *G 370* (BM, GH, K!; the first two collections not seen, cited by Hennipman, 1977:243). Ghiesbreght collections are without precise locality data, but this one was probably made in the Northern Highlands.

4. **Bolbitis pergamentacea** (Maxon) Ching *in* C. Chr., Ind. Fil. Suppl. III, 49. 1934.

—*Leptochilus pergamentaceus* Maxon, J. Wash. Acad. Sci. 14:144. 1924. —TYPE: Jamaica, Green River Valley, *Underwood 1426* (US—2 sheets).

For additional synonymy, see Hennipman (1977:218).

ILLUSTRATION: Hennipman (1977:215).

Plants terrestrial, not climbing; rhizome creeping, bearing brown, ovate, entire scales; fronds dimorphic, the sterile to ca. 70 cm long, with stipe about as long as blade, scaly in lower part; sterile blade with 0–2 pairs of lateral pinnae and a larger terminal pinna, not proliferous, the lateral pinnae broadly elliptic, to ca. 20 cm long, 7 cm broad in middle, entire, acute at apex; fertile fronds to ca. 1 m long, with stipe to 3 times longer than blade, with 1–2 pairs of lateral pinnae and a slightly larger terminal pinna, all pinnae acrostichoid, lateral pinnae to ca. 11 cm long, 2.5 cm broad, entire; veins finely areolate, many areoles with included simple or forked veinlets, main lateral veins ca. 1 cm apart, prominent nearly to margin; leaf tissue below with minute (0.1 mm long), appressed, yellowish hairs, $2n = 82$ (Jam.).

In Tropical Rain Forest; rare in Eastern Highlands near Guatemala border; 300 m. Southern Mex. (Chis. only), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Col.); Gr. Antill. CHIAPAS COLLECTION: *34191*.

5. **Bolbitis portoricensis** (Spreng.) Hennipman, Amer. Fern J. 65:30. 1975.

—*Acrostichum portoricensis* Spreng., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 10:226. 1821. —TYPE: Puerto Rico, *Bertero s.n.* (G; isotypes P, TO).

Acrostichum cladorrhizans Spreng., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 10:225. 1821. —*Leptochilus cladorrhizans* (Spreng.) Maxon, Pterid. Porto Rico 460. 1926. —*Bolbitis cladorrhizans* (Spreng.) Ching *in* C. Chr., Ind. Fil. Suppl. III, 47. 1934. —TYPE: Puerto Rico, *Bertero s.n.* (G; isotypes P, TO).

Acrostichum irregulare Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:173. 1849. —TYPE: Mexico [Veracruz], "Baranca de Sta. María Tlatetlá el Fortin," *Liebmann* [Liebm. Pl. Mex. 2688, Fl. Mex. 666 and 667] (C—folio herb.! isotype B).

For additional synonymy, see Hennipman (1977:246).

ILLUSTRATIONS: Rovirosa, Pterid. Sur. Mex. pl. 61. 1909 [as *Acrostichum alienum*]; Vareschi, Fl. Venez. 1(1):pl. 70. 1969; Hennipman (1977:249); Proctor, Fl. L. Antill. 2:218. 1977.

Plants terrestrial, not climbing; rhizome short-creeping, bearing lanceolate, brown, entire scales; fronds dimorphic, the sterile deltoid-lanceolate, mostly 0.5–1 (1.4) m long, the apex often flagelliform, viviparous at intervals; stipe about as long as blades, sparsely scaly, dull-stramineous; sterile blade with mostly 3–6 pairs of free pinnae, 1–2 pairs of partly adnate pinnae, and a large, deltoid, deeply lobed apex; sterile pinnae mostly 14–22 cm long, 2–4 cm broad (excluding basal auricles), lowermost pair(s) stalked, inequilateral with proximal basiscopic side more developed, more distal pinnae equilateral, crenately lobed (lobes ± rounded, entire to serrulate) to subentire; fertile fronds about as long as sterile ones, but with pinnae greatly contracted, 0.6–1.3 cm broad, to ca. 10 pairs, the lowermost pinnatifid, otherwise subentire, acrostichoid; veins areolate with numerous, included, free, simple or forked veinlets; leaf tissue thin, chartaceous, glabrous.

Along streams and on limestone ridges in Tropical and Lower Montane rain forests (sometimes disturbed), also Seasonal Evergreen Forest; Pacific Coastal Plain, Northern and Eastern highlands, Gulf Coastal Plain; 100–800 m. Southern Mex. (Jal., Mich., Gro., Oax., Ver., Tab.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Ven., Col., Ecu.); Antill., Trin. CHIAPAS COLLECTIONS: *P 6871*, pt. (US); *P 6865* (UC, US); *X&S X-179* (DS, MEXU); *GM s.n.* (DS); *EM 220* (MEXU); *G 407* (K); *13554*; *22521*; *30718*; *32828*; *33858*; *34172*; *35045*; *38093*; *42860*.

6. **Bolbitis serratifolia** (Mertens ex Kaulf.) Schott, Gen. Fil. pl. 14. 1834.

—*Acrostichum serratifolium* Mertens ex Kaulf., Enum. Fil. 66. 1824. —*Leptochilus serratifolius* (Mertens ex Kaulf.) C. Chr., Bot. Tidsskr. 26:289, fig. 3. 1904. —TYPE: Brazil, "Rio Janeiro," collector not stated, Herb. Mertens (not found by Hennipman, 1977).

Leptochilus mexicanus Christ, Bull. Herb. Boissier (2)7:414. 1907. —*Bolbitis mexicana* (Christ) C. Chr., Ind. Fil. Suppl. III, 49. 1934. —TYPE: Mexico, Chiapas, San Cristóbal, *Münch 19* (presumably P, not found; isotypes DS! US!).

For additional synonymy, see Hennipman (1977:171).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(1):pl. 70. 1969; Lindman, Ark. Bot. 1:pl. 8. 1903; Hennipman (1977:173).

Plants terrestrial, not climbing; rhizome creeping, bearing brown, lanceolate, entire scales; fronds dimorphic, to ca. 90 cm long, with tan stipe nearly as long as blade; stipe with numerous appressed tan scales; sterile blade deltoid-lanceolate, to ca. 25 cm broad, not flagelloid or proliferous at apex, 1-pinnate with a ± conform terminal pinna; pinnae numerous, to ca. 12 (30) pairs, cuneate at base, acuminate at apex, crenate-serrate (sometimes doubly) along margin, the serrations ca. 5 mm broad; fertile blades with elliptic, entire, short-stalked pinnae ca. 3 cm long, 0.6–1.0 cm broad, rounded at tip, acrostichoid; veins of sterile blade forming irregular areoles, subcostal areoles with 0–1 excurrent, included, free veinlets; leaf tissue glabrous, chartaceous to subcoriaceous.

Stream banks, Lower Montane Rain Forest; uncommon in Northern Highlands; 550 m. Southern Mex. (Chis. only), C.R., Pan.; S.A. (Sur., Ven., and Col. to NW Arg., Braz., Parag.). CHIAPAS COLLECTIONS: *GM 19* (DS, US); *G 409* (GH, not seen, cited by Hennipman, 1977:172); *32817*.

Judging from the habitat of this and other species of *Bolbitis*, Münch would not have collected *B. serratifolia* anywhere near San Cristóbal (Central Plateau, ca. 2100 m); most likely *GM 19* was gathered in the Northern Highlands.

Species to Be Looked for in Chiapas

Bolbitis umbrosa (Liebm.) Ching *in* C. Chr. —known only from Veracruz. Closely related to *B. aliena*, differing by its tufted fronds, margin of pinnae with teeth in the sinuses, and pinnae more deeply pinnatifid; from *B. portoricensis* differing in areoles usually without included veinlets.

Bolbitis nicotianifolia (Swartz) Alston —known from Guat., Hond., C.R., Pan., S.A., Antill. Closely related to *B. pergamentacea*.

16. BOMMERIA

Bommeria Fourn. *in* Baillon, Dict. Bot. 1:448. "1876" [1877]. —Lectotype (chosen by Maxon, 1913:169): *Bommeria ehrenbergiana* (Klotzsch) Underw. [≡*Gymnogramma ehrenbergiana* Klotzsch]. This is not one of the original species listed by Fournier, who regarded it as a taxonomic synonym of *B. podophylla* (Hook.) Fourn. For reasons of priority, he should have adopted *B. ehrenbergiana*, so that Maxon's choice of lectotype can stand.

Terrestrial or lithophytic; rhizome slender, short- to wide-creeping, scaly, dictyostelic or solenostelic; stipe frequently much longer than blade, light brown to castaneous, pubescent and hairy to glabrous; blade deltoid, pentagonal, pinnatifid (proximally, tripinnatifid basiscopically), main rachis winged throughout, herbaceous to subcoriaceous, pubescent on both sides, sometimes scaly; veins forked, free or anastomosing into areoles; sporangia along veins, naked or partially protected by the reflexed margin in *B. ehrenbergiana*; spores globose-tetrahedral, with a trilete scar, smooth or granular; $x = 30$.

A genus of four New World species, ranging from western Texas to Arizona to Baja California, southward to Costa Rica; one species in Chiapas. Maxon's (1913) report of *B. hispida* in California (a distribution subsequently accepted by other authors) is probably the result of a mislabeled specimen. *Bommeria* appears to be most closely related to *Hemionitis*.

References: Maxon, W. R. 1913. Studies of tropical American ferns—No. 4. Contr. U.S. Natl. Herb. 17:133–179; Gastony, G. J., and C. H. Haufler. 1976. Chromosome numbers and apomixis in the fern genus *Bommeria* (Gymnogrammaceae). Biotropica 8:1–11; Haufler, C. H. 1979. A biosystematic revision of *Bommeria*. J. Arnold Arb. 60:445–476.

1. **Bommeria pedata** (Swartz) Fourn., Bull. Soc. Bot. France 27:327. 1880.

—*Hemionitis pedata* Swartz, Syn. Fil. 20, 209, pl. 1, fig. 3. 1806. —*Gymnogramma pedata* (Swartz) Kaulf., Enum. Fil. 69. 1824. —*Gymnopteris pedata* (Swartz) C. Chr., Ind. Fil. 341. 1905. —Type: locality and collector not stated, according to Haufler (1979) perhaps collected by Née in Mexico and sent by Cavanilles to Swartz.

Illustrations: **Fig. 18**; also Gastony & Haufler (1976:3).

Rhizome short-creeping, ca. 4 mm diam.; rhizome scales brown with a darker center; stipe up to ca. 25 cm long, 2 mm diam., terete, castaneous, shining, glabrous or glabrescent, scaly at base only, scales ca. 4 mm long, ovate-lanceolate, tan, concolorous, entire to long-ciliate on margin, otherwise glabrous; blade pentagonal, pedately cleft, to 14 cm long and broad, scantily strigose above, densely strigose below, hairs mostly 1–1.5 mm long, spreading, stramineous to tan; blade divided into 3 or 5 principal segments: 2 or 4 lateral segments (lowermost pair inequilateral, basiscopically produced, next pair equilateral, pinnatisect) and a deeply pinnatifid terminal segment; ultimate segments oblong to ovate-lanceolate, subfalcate, acute to rounded-acute at tip; veins free, forking; sporangia located along distal ½–⅔ of veins; spores 32 per sporangium or abortive; $n = 2n = 90$.

On rocks, especially limestone; uncommon in Northern Highlands, Central Plateau, Central Depression; ca. 1100 m. Southern and w Mex. (Son., Chih., Dgo., Sin., Baja C.S., Nay., Cma., Zac., Jal., Méx., D.F., Mlos., Mich., Gro., Oax., S.L.P., Pue., Ver.), Guat., Hond., Nic., C.R. Chiapas Collections: *A 1380* (MEXU, UC); *R s.n., R 1066* (not found at K or PH, cited by Rovirosa, Pterid. Sur Mex. 234. 1909); *G 315* (K); *GM 161* (DS, US); *40630*.

Species to Be Looked for in Chiapas

Bommeria ehrenbergiana (Klotzsch) Underw. —S.L.P., Hgo., Ver., Méx., Pue. Distinguished by its areolate venation, blade 10–12 cm long and broad, leaf tissue less densely pubescent than either *B. pedata* or *B. subpaleacea*, and sporangia confined to outer areoles and free marginal veinlets.

17. BOTRYCHIUM

Botrychium Swartz, J. Bot. (Schrader) 1800(2):8, 110. "1801" [1802]. —Lectotype (first chosen by J. Smith?, Hist. Fil. 369. 1875): *Botrychium lunaria* (L.) Swartz [≡*Osmunda lunaria* L.].

Sceptridium Lyon, Bot. Gaz. (Crawfordsville) 40:457. 1905. —Lectotype (first chosen by Clausen, 1938:24): *Sceptridium obliquum* (Muhlenb. ex Willd.) Lyon [≡*Botrychium obliquum* Muhlenb. ex Willd.].

Plants terrestrial; rhizome erect, underground; roots fleshy, thick; new fronds developing from buds that arise in sheathing base of older leaves; fronds few, simply pinnate to ternately divided; fertile part of blade arising from a stalk inserted at base of blade or from along stipe of sterile blade; fertile panicle often exceeding the sterile blade, bipinnate to tripinnate; sporangia globose, opening by a transverse slit; spores numerous, whitish to yellowish globose-tetrahedral, verrucose, translucent; gametophytes subterranean, cylindrical, mycorrhizal, nonchlorophyllous; $x = 45, 46$.

About 23 species according to Clausen (1938); subcosmopolitan, but with the greatest number of species occurring in northern temperate areas. Most species are extremely widespread. Species of *Botrychium* grow in shaded woods, edges of woods, or grassy meadows. Despite the small number of species in Mexico, *Botrychium* presents some of the most difficult taxonomic problems to be found in our area.

Reference: Clausen, R. T. 1938. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club 19(2):1–177.

a. Fertile panicle arising from base of blade (sterile blade sessile); blade rather thin-textured; roots not contractile .... 3. *B. virginianum*

aa. Fertile panicle arising away from blade, nearer the rhizome (sterile blade not sessile); blade relatively thick-textured; roots often contractile.

b. Ultimate divisions of sterile blades ovate, roundish, oblong, or oblanceolate, relatively uniform in size; leaf tissue usually thick .... 2. *B. schaffneri*

bb. Ultimate divisions usually elongate, lanceolate, at least the terminal ones, segments of blade not all the same size and shape; leaf tissue thin to moderately thick .... 1. *B. dissectum* ssp. *decompositum*

1. **Botrychium dissectum** Spreng. ssp. **decompositum** (Mart. & Gal.) Clausen, Mem. Torrey Bot. Club 19:58. 1938.

—*Botrychium decompositum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):51, pl. 1. 1842. —*Sceptridium decompositum* (Mart. & Gal.) Lyon, Bot. Gaz. (Crawfordsville) 40:457. 1905. —Type: Mexico, Veracruz, Mt. Orizaba, *Galeotti 6452* (BR! photos GH, US!).

Illustrations: original; see also Rovirosa, Pterid. Sur Mex. pl. 70. 1909; Stolze, Fieldiana, Bot. 39:7, fig. 1a. 1976.

Roots contractile or not; fronds 15–45 cm long; common stipe mostly 5 (10) cm long or less, moderately stout (2–4 mm diam.), glabrescent; fertile panicle inserted well below the sterile blade, usually greatly exceeding length of sterile blade, bipinnate to tripinnatifid; sterile blade stalked 6–25 cm long, ternately compound, 5–15 cm long, 7–23 cm broad; penultimate divisions of sterile blade usually acute, ovate, often divided almost to the main vein; ultimate divisions ovate, oblong, or lanceolate, irregularly serrulate, terminal segments largest; leaf tissue thin-herbaceous to chartaceous, glabrous; n = 45 (C.R.).

Edges of Lower Montane Rain Forest, Pine-Oak-Liquidambar Forest, Pine-Oak-Arbutus; uncommon in Northern Highlands, Central Plateau; 900–1700 (2400) m. Southern Mex. (Hgo., Ver., Oax.), Guat., Hond., C.R. Chiapas Collections: *R 1063* (GH, not seen; PH!); *31488*; *32168*; *41362*.

This seems to occur at a lower elevation than *B. schaffneri,* which see for additional discussion.

The other subspecies of *B. dissectum* (represented by four varieties) occurs from Nova Scotia and New Brunswick west to the Mississippi Valley and south to Florida and Texas; also Jamaica.

Stolze (Fieldiana, Bot. 39:6. 1976) has recognized *B. underwoodianum* Maxon (type from Jamaica) as occurring in Guatemala, distinguishing it on the basis of the segment tips rounded (instead of acute), ultimate segments widely spaced, with broad sinuses, and pinnae spreading at a broad angle from the rachis. At least one Chiapas collection (*12838*) fits this characterization and matches Stolze's illustration (but not very well the original one by Maxon). This specimen is difficult to accommodate in either *B. dissectum* or *B. schaffneri,* but I do not understand sufficiently *B. underwoodianum* to be able to place it there. This whole complex is badly in need of monographic revision and field study.

2. **Botrychium schaffneri** Underw., Bull. Torrey Bot. Club 30:51. 1903.

—*Sceptridium schaffneri* (Underw.) Lyon, Bot. Gaz. (Crawfordsville) 40:458. 1905. —Type: Mexico, San Luis Potosí, "prope San Luis Potosí," *Schaffner s.n.* (NY; isotype K).

Illustrations: **Fig. 19**; Knobloch & Correll, Ferns Chih. 39: pl. 8, fig. 4. 1962.

Roots contractile; fronds (4) 10–35 cm long; young croziers sparsely to moderately hairy; common stipe ca. 5 cm long or less, moderately stout (2–4 mm diam.), sparsely hairy to glabrescent; fertile panicle inserted well below (proximal to) sterile blade, usually greatly exceeding length of sterile blade, tripinnate; sterile blade stalked 2–12 cm, ternately compound, to 3-pinnate-pinnatifid, to 12 cm long, 16 cm broad, deltoid; ultimate segments ovate, oblong, or roundish, small (to 6 mm long, 5 mm broad), serrulate to ± entire at apex, all approximately the same size (terminal segments not noticeably larger); leaf tissue thick-herbaceous, glabrous; $2n$ = ca. 90 (Edo. Méx.).

Grassy slopes or in Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau; 1600–2800 m. Nearly throughout Mex. (Chih., Dgo., Jal., S.L.P., Hgo., Méx., Oax.), Hond., Nic., C.R.; S.A. (Col. to nw Arg.). Chiapas Collections: *T&L 41124* (DS); *T 50* (DS); *Z 270* (DS); *GM 21* (DS); *12518*; *12920*; *29197*; *32640*; *32344*.

Quite a few Chiapas collections are intermediate between *B. schaffneri* and *B. dissectum* var. *decompositum* (e.g., *22018*; *22060*; *31940*; and *37847*), and I can not place them with either species without expanding the descriptions of Clausen (1938). In general, typical *B. schaffneri* seems to grow at higher elevations than *B. dissectum* ssp. *decompositum,* but there are as yet too few collections to be certain of this. The Chiapas intermediates have the thicker blade texture of *B. schaffneri* and dissection that seems to be closer to *B. dissectum,* although tending towards *B. schaffneri.* On the basis of blade dissection, Clausen (1938) placed these two species in different sections, but this seems wholly artificial. The whole problem needs further study in Mexico and Central America, with the monograph by Clausen (1938) probably needing considerable modification.

3. **Botrychium virginianum** (L.) Swartz, J. Bot. (Schrader) 1800(2):111. "1801" [1802].

—*Osmunda virginiana* L., Sp. Pl. 2:1064. 1753. —Type: "America," *Kalm s.n.* (LINN 1244.3).

Osmunda cicutaria Savigny *in* Lam., Encycl. Méth. 4:650. "1797" [1798]. —*Botrychium cicutarium* (Savigny) Swartz, Syn. Fil. 171. 1806. —Type: based on plants collected by Plumier in Hispaniola, Tract. Fil. Amer. 136, pl. 159. 1705.

Botrychium virginicum (L.) Willd. var. *mexicanum* Hook. & Grev., Bot. Misc. 3:223. 1833. —Syntypes: Mexico, Veracruz, Jalapa, *Chamisso s.n.*; "Rigla," *Capt. Veitch s.n.* (both presumably K).

Botrychium virginianum var. *meridionale* Butters, Rhodora 19:213. 1917. —TYPE: Mexico, Chiapas, *Ghiesbreght 252* (GH; isotype YU!).

ILLUSTRATION: Knobloch & Correll, Ferns Chih. 39. 1962.

Roots without contractions; fronds mostly 25–75 cm long; young croziers densely hairy; common stipe 15–50 cm long, stout (to 5 mm diam.), sparsely hairy to glabrous at maturity; fertile panicle inserted at base of sterile blade, nearly equaling to greatly exceeding length of sterile blade, tripinnate; sterile blade ternately compound, to 3-pinnate-pinnatifid, broadly deltoid; ultimate segments oblong to obovate, dentate or acutely incised at apex; leaf tissue thin, herbaceous, glabrous; $n = 92$ (Chis., U.S., Eur.).

In woods or grassy slopes in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak Forest; relatively common in Northern Highlands (Jitotol Ridge) and Central Plateau, uncommon in Sierra Madre; 1600–2900 m. Canada and E U.S., nearly throughout Mex. (Hgo., Chih., Mich., Gro., Mlos., D.F., S.L.P., Méx., Ver.), Guat., Nic., C.R., Pan.; S.A. (Col. to Bol., S Braz.); Gr. Antill.; N Eur., Asia. CHIAPAS COLLECTIONS: *P 10219* (US); *G 252* (YU); *G 430* (K); *L&S 9879* (US); *8915*; *9783*; *27241*; *31315*; *31840*; *31939*; *32085*; *32330*; *32557*; *32641*; *32751*; *33692*; *34558*; *34639*; *37329*.

Clausen (1938) distinguished *B. cicutarium* from *B. virginianum* primarily on the basis of the former having fertile panicle equaling or less than the length of the sterile blade, with *B. virginianum* having a fertile panicle much longer than the sterile blade. This seems to be an extremely variable character with regard to Chiapas material, with both types (and intermediates) being found. I am unable to find any other characters that will distinguish the two species and thus must synonymize *B. cicutarium*. Relative length of fertile and sterile blade must also be a variable character throughout Mexico, as Clausen recognized both species throughout the country.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Botrychium underwoodianum Maxon —Guat., Hond., C.R., Ven., Jam. (according to Stolze, Fieldiana, Bot. 39:6. 1976). Apparently closely related to *B. dissectum* ssp. *decompositum,* which see for additional discussion.

18. CAMPYLONEURUM

Campyloneurum Presl, Tent. Pterid. 189. 1836. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 95. 1875): *Polypodium repens* Aubl. [≡*Campyloneurum repens* (Aubl.) Presl]. Christensen (Ind. Fil. 50. 1906) regarded *Polypodium phyllitidis* L. as type.

Rhizome short- to long-creeping, dictyostelic, bearing ovate to lanceolate, often clathrate, ± entire, brownish scales from a peltate base; fronds simple, nearly sessile to long-stipitate, abscissing cleanly from phyllopodia, entire to repand along margin, attenuate at both ends; venation areolate with 1 to usually several to many rows of regular to irregular areoles formed by anastomosing cross-veinlets from main lateral veins, these cross-veinlets producing 2 excurrent, simple, free veins, a third excurrent vein sometimes completely bisecting areoles; leaf tissue thin to often thick, firm, glabrous on both sides; sori round, exindusiate, borne at ends of included veinlets, usually in two rows between main lateral veins, often large (to 3 mm diam.); sporangia (and sori) without paraphyses; spores bilateral, usually translucent-yellowish, smooth, without obvious perispore; gametophytes surficial, cordate; $x = 37$.

A Neotropical genus of perhaps 25 species (Copeland, 1947). The range of the genus is nearly that of the two most widespread species, *C. phyllitidis* and *C. angustifolium*: southern Mexico to northwestern Argentina, southern Brazil, Florida, and Antilles. All eight species known from Mexico are found in Chiapas. Typically, the species are epiphytes, but several species may be found occasionally on the ground or on rocks. *Campyloneurum* is badly in need of monographic revision.

a. Rhizome 1–2 mm diam., greenish, nearly scaleless behind apex; fronds sessile or nearly so; low elevation.
b. Blade elliptic, broadest in the middle; main lateral and areolar veins conspicuous; rhizomes long-creeping; leaf tissue chartaceous .... 6. *C. serpentinum*
bb. Blade oblanceolate; main lateral and areolar veins inconspicuous or hidden; rhizomes short-creeping; leaf tissue thick, subcoriaceous .... 4. *C. occultum*
aa. Rhizome more than 2 mm diam., usually more than 4 mm, blackish, usually scaly behind apex; low to high elevation.
c. Blade linear, tapering below nearly or quite to rhizome, fronds usually without a distinct stipe; blade less than 1.5 cm broad .... 2. *C. angustifolium*
cc. Blade with or without a distinct stipe, broader than 2 cm.
d. Fronds without a distinct stipe, blade narrowed to rhizome; blade mostly broader than 6 cm; low elevation (<600 m) .... 5. *C. phyllitidis*
dd. Fronds with a distinct stipe; middle to high elevation.
e. Main lateral veins clearly visible, straight; rhizome not pruinose; rhizome apex scales linear-lanceolate with an attenuate tip (single file of cells); leaf tissue chartaceous, lacking lime-dots above; base of blade acute or acuminate; blade (3) 6–8 cm broad .... 7. *C. tenuipes*
ee. Main lateral veins faintly or not at all distinct; rhizome often pruinose; rhizome apex scales ovate-lanceolate, without an attenuate tip; leaf tissue subcoriaceous, sometimes with lime-dots above; base of blade abruptly cuneate or rounded; blade 2–5 (6) cm broad.
f. Main lateral veins indistinct; blade mostly 2–3 (4) cm broad, entire; sori very large, often 2–3 mm diam.; high elevation (2400–3000 m) .... 1. *C. amphostenon*

ff. Main lateral veins faintly visible; blade mostly 2–5 (6) cm broad, subentire to often repand; sori small, mostly 1–2 mm diam.; low to middle (rarely high) elevation [300–2000 (2700) m].
  g. Blade elliptic, ±entire-margined, not parallel-sided for most of its length; midrib stramineous, rounded below; main lateral veins not at all or only very faintly visible; low elevation (350 m); rare .... 3. *C. costatum*
  gg. Blade linear, often repand-margined, parallel-sided for most of its length; midrib stramineous to darkened, sharply angular below; main lateral veins faintly visible; middle (rarely high) elevation [600–2000 (2700) m]; common .... 8. *C. xalapense*

1. **Campyloneurum amphostenon** (Kunze ex Klotzsch) Fée, Gen. Fil. 258. 1852.

—*Polypodium amphostenon* Kunze ex Klotzsch, Linnaea 20:399. 1847. —*Polypodium angustifolium* var. *amphostenon* (Kunze ex Klotzsch) Baker *in* Martius, Fl. Bras. 1(2):530. 1870. —*Campyloneurum angustifolium* var. *amphostenon* (Kunze) Farwell, Amer. Midl. Naturalist 12:296. 1931. —TYPE: Venezuela, Merida, *Moritz 120b* (isotypes K—3 sheets!).

ILLUSTRATION: **Fig. 20.**

Closely related to *C. angustifolium*, but differing in (1) long-creeping, usually pruinose rhizome, often ca. 1 cm between stipe bases; (2) fewer fronds per plant; (3) stipe evident, usually more than 5 cm long, stout; (4) larger fronds, to ca. 1 m long, 2–4 cm broad; (5) veins immersed, but usually faintly visible; (6) 3 or 4 series of areoles between midrib and margin; (7) very large sori, often 3 mm diam.

In Evergreen Cloud Forest, rarely Montane Rain Forest; s Sierra Madre, higher peaks and ridges of Central Plateau; 2400–3000 m. Southern Mex. (Oax.), Guat., Salv., C.R.; S.A. (Ven. and Col. to Bol.). CHIAPAS COLLECTIONS: *T 486, 814* (DS); *G 201* (BM); *GM 38* (DS); *L&S 9856, 9885, 9926* (US); *15109*; *22021*; *22066*; *22798*; *22998*; *25298*; *26260*; *26780*; *27219*; *31751*; *31882*; *32081*; *34684*.

This species is closely related to *C. angustifolium*, and I am not convinced that it can be separated specifically. Nevertheless, it differs in a number of characters and occurs in a different vegetational formation, nearly always at higher elevations than *C. angustifolium*. I maintain both species as distinct to call attention to their differences. Of the many collections of both of these species in Chiapas, only three (*22066*; *26780*; *34684*) show some morphological intermediacy. I tentatively place them with *C. amphostenon* because of their habitat (Evergreen Cloud Forest) and elevation (2700–2800 m). Only at a single locality have both species been collected together (Cerro Hueytepec), and from there I have seen 8 collections of *C. amphostenon* and only one of *C. angustifolium* (*La 165*).

2. **Campyloneurum angustifolium** (Swartz) Fée, Gen. Fil. 257. 1852.

—*Polypodium angustifolium* Swartz, Prodr. Veg. Ind. Occ. 130. 1788. —TYPE: Jamaica, presumably *Swartz* (S).

ILLUSTRATIONS: Knobloch & Correll, Ferns Chih. 136. 1962; Vareschi, Fl. Venez. 1(2):pl. 195. 1969; Lowe, Ferns 1:pl. 48. 1856; Small, Ferns SE States 86. 1938.

Plants epiphytic, rarely epipetric; rhizome short-creeping, mostly 4–7 mm diam., occasionally pruinose, bearing numerous ovate, brownish, clathrate scales to ca. 7 mm long, 2 mm broad; fronds numerous, crowded, to ca. 70 cm long, with stipe usually very short (<2 cm long), infrequently to 12 cm; blade linear, often falcate, mostly (0.3) 0.6–1.5 cm broad, entire, gradually tapering on both sides of middle, distally to a long, acuminate apex; veins immersed, not easily seen, joining in 1–2 irregular rows of areoles, blades without prominent lateral veins; leaf tissue thick, coriaceous, shining above and often below, usually lacking white lime-dots; sori large, 1.0–2.0 (2.5) cm diam. when fully developed, in 1 (2) irregular row(s) on both sides of midrib; $n = 37$ (Peru), 74 (Jam., C.R.).

Very common epiphyte in Northern and Eastern highlands, Central Plateau, Sierra Madre; mostly Montane Rain Forest, Pine-Oak-Liquidambar Forest, infrequently Tropical and Lower Montane rain forests, Seasonal Evergreen Forest, Evergreen Cloud Forest; (350) 700–2200 (2700) m. Southern Mex. (Chih., S.L.P., D.F., Hgo., Ver., Gro., Oax.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to NW Arg., s Braz.); Antill., Fla. CHIAPAS COLLECTIONS: *T&L 41200, 41203, 41426* (DS); *R 1043* (PH); *MC 1558, 1570, 1912* (US); *H&S 20428*; *P 7238* (UC); *G 259* (K); *A 1226, 1277* (DS, UC); *Dr 1624* (MEXU, US); *La 99, 165, 555, 979* (DS); *R&B 19785* (DS, US); *6122*; *6311*; *6449*; *8129*; *9377*; *21196*; *21559*; *21684*; *21685*; *21793*; *21933*; *22278*; *22360*; *22445*; *23113*; *23278*; *23685A*; *25134*; *25526*; *27071*; *27764*; *27855*; *29245*; *31420*; *31551*; *32259*; *32312*; *32548*; *33384*; *33464*; *34604*; *35368*; *38012*; *38217*; *38943*.

3. **Campyloneurum costatum** (Kunze) Presl, Tent. Pterid. 190, pl. 7. 1836.

—*Polypodium costatum* Kunze, Linnaea 9:38. 1834. —TYPE: Cuba, *Poeppig s.n.* (LZ, destroyed; isotypes BM! K! L—photo C!, P!).

ILLUSTRATION: Small, Ferns SE States 90. 1938.

Similar to *C. xalapense*, differing in the more elliptic blade; midrib stramineous, rounded below, flattened or rounded on adaxial side; main lateral veins not at all or only very faintly visible; secondary veins not visible; $n = 37$ (C.R., Jam.).

Epiphytic in Tropical Rain Forest; rare in Eastern Highlands near the Guatemala border; 350 m. Southern Mex. (Oax.), Bel., Guat.; Fla.?, Antill., Trin. CHIAPAS COLLECTIONS: *33188*; *33190*.

This species seems to grow at generally lower elevations than *C. xalapense*, with which it can be confused.

4. **Campyloneurum occultum** (Christ) L. D. Gómez, Brenesia 8:46. 1976.

—*Polypodium occultum* Christ, Bull. Herb. Boissier (2)5:7. 1905. —TYPE: Costa Rica, "Río de las Vueltas pr. Tucurrique," *Tonduz 12756* (P, photo BM! isotypes US, photo BM!). *Tonduz 12752* (P!) from the same locality is this species.

ILLUSTRATION: **Fig. 21.**

Similar to *C. serpentinum* but differing in (1) short-creeping rhizome; (2) phyllopodia ca. 1 mm long; (3) oblanceolate fronds (broadest in distal third) tapering to rhizome at base; (4) subcoriaceous leaf tissue; (5) areolar veins not at all raised, not or only barely visible under reflected light.

Epiphyte in Tropical Rain Forest; Northern Highlands (6–12 km s of Palenque); 300 m. Belize, Hond., Nic., C.R., Pan.; S.A. (Col., Ecu.). Chiapas Collections: *26527*; *35385*.

The two Chiapas specimens are not quite typical of the species, but I believe they more closely resemble *C. occultum* than they do *C. serpentinum*, perhaps the closest relative of *C. occultum*.

5. **Campyloneurum phyllitidis** (L.) Presl, Tent. Pterid. 190, pl. 7, figs. 18–20. 1836.

—*Polypodium phyllitidis* L., Sp. Pl. 2:1083. 1753. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:341. 1977): Plumier's Descr. Pl. Amer. pl. 38, 1693, illustrating a plant from the "Antilles"; LINN 1251.5 is not this species, but *Niphidium crassifolium* (L.) Lellinger, and was added to LINN after 1755 (Jackson, 1912).

Campyloneurum latum Moore, Ind. Fil. 225. 1861. —*Polypodium latum* (Moore) Sodiro, "Crypt. Vasc. Quit. 371. 1893" [=Anal. Univ. Centr. Ecuador 11(73):110. 1894]. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:342. 1977): St. Vincent, *Guilding s.n.* (K).

Illustrations: Lowe, Ferns 1:pl. 26. 1856; D. C. Eaton, Ferns N. Amer. 1:pl. 42. 1879; Rovirosa, Pterid. Sur Mex. pl. 45. 1909.

Plants epiphytic; rhizome short-creeping, 5–8 mm thick, not glaucous, enveloped in a thick mass of roots so not easily seen, rhizome apex with brownish, minutely clathrate scales ca. 5 mm long, 1 mm broad; fronds (30) 60–120 cm long, (4) 6–10 cm broad, margin subentire to usually repand, lamina gradually tapered below nearly or quite to rhizome (stipe sometimes narrowly winged for up to 15 cm); main lateral veins elevated below, prominent, ca. 1.5 cm apart near base of blade, 0.8–1.0 cm apart at middle, ca. 0.5 cm apart near frond apex, which is abruptly reduced with a short caudate tip less than 1 cm long; leaf tissue rigidly chartaceous, sublustrous on both sides; sori in two regular rows between main lateral veins; $n = 74$ (Fla., Jam., Gal.); $2n = 148$ (Jam.).

Lower Montane and Tropical rain forests; uncommon in s Pacific Coastal Plain, lower elevations of Northern and Eastern highlands; 300–600 m. Southern Mex. (S.L.P., Hgo., Jal., Mich., Oax., Pue., Ver., Tab., Yuc.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Guy., Ecu. to Bol., Braz., n Arg., Urug., Parag.); Fla., Antill., Trin. Chiapas Collections: *EM 17632* (MEXU, US); *G 450*, pt. (YU); *27434*; *31569*; *32826*; *34098*.

6. **Campyloneurum serpentinum** (Christ) Ching, Sunyatsenia 5:263. 1940.

—*Polypodium serpentinum* Christ, Bull. Herb. Boissier (2)6:51. 1906. —Type: Costa Rica, Navarro, *Wercklé s.n.* (P! possible isotype US!).

Illustration: **Fig. 20.**

Plants epiphytic, vinelike, twining; rhizome long-creeping, (0.7–1.5 cm between stipe bases), 1–2.5 mm diam., greenish (at least when young), sparsely clothed with brownish subulate scales from a peltate base, ca. 2.0–2.5 mm long; phyllopodia 0.5 mm long or less; blade elliptic, mostly 25–40 cm long, 2.5–6 cm broad, tapering evenly on both sides of middle, below nearly to rhizome or to a very short, winged stipe 3 cm long or less; main lateral veins stramineous to darkened, readily visible below, ca. 4–6 mm apart in middle of frond; areoles 1.5–2 times as broad as long (areolar veins readily visible, usually slightly raised), regular, with 2 free, short-excurrent, included veinlets; leaf tissue chartaceous, thin, dull on both sides, lacking lime-dots above; sori in two regular rows.

In Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; moderately common in s Pacific Coastal Plain, Northern and Eastern highlands, e edge of Central Plateau; 300–900 m. Southern Mex. (Oax., Ver.), Bel., Guat., Hond., Nic., C.R., Pan. Chiapas Collections: *P 6751* (BM, UC, US); *EM 207* (MEXU, US); *Dr 1617* (MEXU); *Dr 1618* (US); *C&D 217* (US); *22151*; *32816*; *32920*; *33935*; *34063*; *34453*.

Campyloneurum serpentinum approaches very closely several largely South American species, e.g., *C. lapathifolium* (Poir.) Ching, *C. ophiocaulon* (Klotzsch) Fée, and especially *C. lindigii* (Mett.) Ching. Another closely related species is *C. repens* (Aubl.) Presl, known from Central and South America. The whole group needs monographic study before names can be comfortably applied. In the absence of such a thorough study, I use the oldest name that has been applied to Central American material.

7. **Campyloneurum tenuipes** Maxon, Contr. U.S. Natl. Herb. 13:7. 1909.

—Guatemala, Alta Verapaz, near Cobán, *v. Tuerckheim II. 1952* (US!; isotype US!).

Illustration: **Fig. 22.**

Closely related to *C. xalapense*, but differing in (1) blade attenuate to usually acute at base; (2) blade broad-elliptic, mostly (3) 6–8 cm broad; (3) main lateral veins very distinct, raised below; (4) white lime-dots lacking; (5) rhizome never pruinose. Chromosomes are $2n = 37$ II (Oax., Chis.).

Usually terrestrial or epipetric (infrequently epiphytic) in Montane Rain Forest, Pine-Oak-Liquidambar Forest, infrequently Evergreen Cloud Forest, Lower Montane Rain Forest; scattered in Northern and Eastern highlands, Sierra Madre, lower elevations of Central Plateau; 1000–2200 m. Southern Mex. (Gro., Oax.), Guat. Chiapas Collections: *GM 9* (DS, pt.; US); *EM 18051* (MEXU); *G 292* (BM, YU); *9414*; *16129*; *21367*; *21686*; *21687*; *21721*; *24113*; *25053*; *31372*; *32285*; *34407*; *34629*; *34629-A*; *38942*; *42556*; *42661*.

Campyloneurum tenuipes in Chiapas is mostly terrestrial; three collections, none exactly typical of the species, were growing as epiphytes (*9414*; *32285*; *34629*). The type was collected on rocks.

Maxon compared *C. tenuipes* with *C. xalapense*, and I agree that this relationship is very close; another close relative is *C. costatum*. Monographic revision is needed.

8. **Campyloneurum xalapense** Fée, Gen. Fil. 258. 1852.

—*Polypodium xalapense* (Fée) Christ, Bull. Soc. Roy. Bot. Belgique 35:231. 1896. —Type: Mexico [Veracruz], Xalapa, *Galeotti 6273* (presumably P; isotype K!).

Campyloneurum caudatum Fée, Mém. Fam. Foug. 8:96. 1857. —*Polypodium weatherbyanum* Seymour, Phytologia 31:171. 1975. —Type: Mexico [Veracruz], Cordoba et Huatusco, *Schaffner 176* (not found at P; isotype K!).

Illustration: **Fig. 21.**

Plants epiphytic, infrequently on rocks; rhizome short-creeping, ca. 4–10 mm diam., not glaucous, black, covered with brownish, narrowly lanceolate, minutely clathrate scales with an enlarged peltate base, scales 3–4 mm long; fronds (30) 40–75 cm long, with stipe 3–12 (25) cm long; blade linear, mostly 2–5 (6) cm broad, abruptly narrowed distally into a long caudate apex to 7 cm long, below gradually narrowed to an attenuate base but at last abruptly cuneate or rounded, *Allosorus angustifolius* (H.B.K.) Presl var. *minus* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:219. 1849. —Syntypes: Mexico, Oaxaca, "pr. Yavesia," *Liebmann* [Liebm. Pl. Mex. 2349, Fl. Mex. 231] (C!); "inter La Galena et San Miquel," *Liebmann* [Liebm. Pl. Mex. 2350, Fl. Mex. 230] (C!). I choose Fl. Mex. 231 as lectotype.

Illustration: Knobloch & Correll (1962:88).

Rhizome short-creeping, compact; fronds mostly 15–30 cm long, with stipe 0.5–1.0 (1.5) times as long as blade, ca. 1–2 mm diam., atropurpureous to black, ± shining, glabrous; rachis also glabrous and black for ½–⅔ its length; blade ovate-deltoid, 3-pinnate below, becoming 2-pinnate distally, lowermost pinnae largest, to 9 cm long, strongly ascending at 30–45° angle to rachis; ultimate segments linear, mostly 1–3 cm long, 1–3 mm wide, each pinna ending in a prolonged segment; leaf tissue glabrous on both sides, subcoriaceous; indusia consisting of the narrow modified whitish erose leaf margin, continuous or broken along length of segments, not hairy or glandular; spores 32 per sporangium, ca. 63 μm diam.

On rocky slopes in Pine-Oak woods, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest, Tropical Deciduous Forest; scattered in Sierra Madre (both slopes), less often in Central Plateau; 700–1600 m. Throughout Mex. (Chih., Son., Sin., Dgo., Gto., Méx., D.F., Pue., Mlos., Mich., Ver., Nay., Gro., Jal., Cma., Oax.), Guat., Salv., Hond., Nic., C.R.; S.A. (Ven.). Chiapas Collections: *G 242* (K, PH); *A 1384* (UC); *GM s.n.* (DS, P); *GM 86* (DS); *EM 4098* (MEXU); *EM 1725* (K, MEXU, US); *13823*; *20549*; *21742*; *28671*; *38539*; *41190*.

Allosorus decompositus Mart. & Gal. (type from Oaxaca, Juquila, *Galeotti 6362,* BR!) is close to *C. angustifolia,* but it varies in the direction of *C. cuneata.* I am inclined to regard it as a distinct species for the present.

3. **Cheilanthes chaerophylla** (Mart. & Gal.) Kunze, Linnaea 23:243, 307. 1850.

—*Allosorus chaerophyllus* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):47, pl. 11. 1842. —Type: Mexico, Oaxaca, Juquila, *Galeotti 6367* (presumably BR, not found; isotype P!).

Illustration: **Fig. 23.**

Similar to *C. hirsuta,* differing in the reddish to maroon to purplish stipe; blade 4-pinnate at base; ultimate segments not pendent; indusia entire or only minutely glandular at margin (not long-hairy); short conical protuberances absent on leaf tissue above; and smaller spores. Chiapas collections all have very large fronds (ca. 50 cm long).

Known from essentially two areas in Chiapas, in Pine-Oak and Pine-Oak-Liquidambar forests; uncommon in Northern Highlands (Jitotol Ridge), SE corner of Central Plateau; 1300–1700 m. Distribution uncertain but perhaps confined to s Mex. (Méx., Jal., Oax.) and Guat. Chiapas Collections: *Z 514* (DS); *MC 2269* (MEXU); *29955*; *36942*; *41035*. *32443* may be a juvenile collection of this species.

4. **Cheilanthes complanata** A. R. Smith, Amer. Fern J. 70:19, figs. 7–8. 1980.

—Type: Mexico, Chiapas, Munic. Motozintla de Mendoza, slope of Cerro Mozotal, *Breedlove 41747* (DS!).

Illustration: only the original.

Differing from *C. hirsuta* in the sharply bicolorous rhizome scales with golden-brown margins and blackish median stripe; blade pentagonal, nearly as broad as long, planar, ultimate segments not pendent; ultimate segments obovate to narrow-elliptic, mostly 2–4 times longer than broad; leaf tissue dark green, glabrous on both sides; indusia not sharply differentiated from leaf tissue, membranaceous, entire (without glands or hairs), not or only slightly decurrent onto next axis.

Apparently epiphytic or on rocks in Evergreen Cloud Forest; rare in s Sierra Madre; 3000 m. Known only from Chiapas from the type and a topotype: *40335*.

This is the most distinct species of the *Cheilanthes marginata* group in Mexico and Central America. The best characters for separating *C. complanata* from its nearest relatives (*C. marginata, C. chaerophylla, C. hirsuta*) are the planar blades and the thin, entire indusia that completely lack trichomes. Another relative may be *C. cuneata,* but that species has a black or nearly black stipe and rachis (reddish brown in *C. complanata*), larger blade, darker, concolorous rhizome scales, and more sharply differentiated indusia.

5. **Cheilanthes cucullans** Fée, Mém. Fam. Foug. 7:39, pl. 25, fig. 4. 1857.

—Type: Mexico, "ad vallem Mexicanum," *Schaffner 82* (not found at P; isotype K!).

Illustration: Knobloch & Correll (1962:90).

Similar to *C. microphylla* but differing in blade bipinnate-pinnatifid to tripinnate at base; more numerous hairlike scales on rachis and costae below; and wide-creeping rhizome; $2n =$ ca. 60 (Oax.).

Known in Chiapas from a single collection on rocky, Oak slopes; rare in s Central Plateau; 1500 m. Western and s Mex. (Chih., Jal., Méx., Mich., D.F., Pue., Oax.), Guat. Chiapas Collection: *14501*.

6. **Cheilanthes cuneata** Link, Hort. Reg. Bot. Berol. 2:40. 1833.

—Type: described from cultivated material, origin not known (presumably B).

Illustration: **Fig. 24.**

Rhizome short-creeping, stout, clothed at apex with dense, dark-castaneous to atropurpureous, lanceolate, shining scales; fronds to ca. 50 cm long, with stipe equaling or slightly exceeding blade length, ca. 2 mm diam., atropurpureous to ebeneous, shining, glabrous; blade broadly deltoid, nearly as broad as long, 3-pinnate or nearly so at base; lowermost pinnae much the longest, strongly ascending at ca. 45° to rachis, to 15 cm long, basiscopically developed; ultimate segments ovate to elliptic, larger ones 4–6 mm long, 1–2.5 mm wide, obtuse to acute at tip; leaf tissue and axes glabrous; indusia ± continuous to interrupted around segments.

Known from two collections in the state (one without precise locality), rocky slope adjacent to Montane Rain Forest; rare in s Sierra Madre; 1900 m. Elsewhere from s and w Mex. (Sin., Nay., Jal., Mich., Mlos., Méx., Gro., Oax., Ver.). Chiapas Collections: *GM s.n.* (DS); *22683*.

Most closely related to *C. angustifolia* but differing by the broadly deltoid blades with ovate to elliptic ultimate segments.

7. **Cheilanthes farinosa** (Forssk.) Kaulf., Enum. Fil. 212. 1824.

—*Pteris farinosa* Forssk., Fl. Aegypt.-Arab. 187. 1775. —*Aleuritopteris farinosa* (Forssk.) Fée, Gen. Fil. 153, pl. 12B, fig. 1. 1852. —Type: Yemen, *Forsskål s.n.* (isotype BM!).

Aleuritopteris mexicana Fée, Gen. Fil. 154. 1852. —Type: Mexico, Oaxaca, Llano verde, *Galeotti 6551* (presumably P; isotypes BR—5 sheets! photo BM!).

Illustrations: Knobloch & Correll (1962:88); Tryon, Contr. Gray Herb. 194:101. 1964; see also Fée, cited above.

Rhizome suberect to erect, with dark reddish-brown to blackish lanceolate scales at apex; fronds mostly 15–35 cm long, with stipe 1.0–2.5 times longer than blade, 0.5–1.0 mm diam., dark reddish to purplish brown, shining, with scattered, spreading, castaneous, entire scales 4–5 mm long toward base, sometimes also weakly farinose, otherwise glabrous; vernation circinate; blade ovate-triangular, deeply bipinnatifid to barely bipinnate below, pinnate-pinnatifid distally, mostly 4–8 cm broad; pinnae upcurved at their apex, lowermost the largest, strongly basiscopically developed with basiscopic pinnules faintly to decidedly pinnatifid; leaf tissue below creamy- to yellowish-waxy, without hairs or scales, glabrous or faintly waxy above; indusia with a highly modified reflexed margin ca. 1 mm broad, ± continuous around pinna margins, tan to whitish, erose; n = 30, 60 (O.W.).

Relatively common on or at the base of rocks, or on steep slopes in Pine-Oak or Pine-Oak-Liquidambar Forests, infrequently Evergreen Cloud Forest; Central Plateau, Northern Highlands, s Sierra Madre; 1000–2300 (2900) m. Throughout Mex. (Chih., Dgo., Sin., Hgo., S.L.P., Méx., Mlos., Mich., Jal., Pue., Ver., Oax.), C.R.; S.A. (Peru); also Asia, Afr., and Pacific Basin. Chiapas Collections: *R 968* (PH); *L 1063* (DS); *GM 67* (DS, US); *A 1346* (UC); *G 228* (K, PH); *EM 1700* (K, MEXU); *L&S 9961* (US); *MC 1624* (US); *C&D 130a* (US); *13774*; *22397*; *22923*; *23256*; *27742*; *28694*; *31839*; *32756*; *33599*; *37337*; *38752*; *40700*; *41004*; *41069*; *41828*.

A good case can be made for recognizing *Aleuritopteris*, a primarily Asiatic genus of about 20 species. *Aleuritopteris* is distinguished from *Cheilanthes* by the usual absence of hairs and scales on the blade, usually farinose fronds, the highly modified reflexed leaf margin, and sessile pinnae that are strongly basiscopically developed. In addition to the extremely widespread *A. farinosa*, Ching (Hong Kong Naturalist 10:194–204. 1941) admitted to *Aleuritopteris* two other species from Mexico and Central America: *A. aurea* (Baker) Ching from Mexico and Guatemala, and *A. aurantiaca* (Cav.) Ching from Jalisco.

8. **Cheilanthes hirsuta** Link, Hort. Reg. Bot. Berol. 2:40. 1833.

—Type: based on material cultivated in the Berlin Botanic Garden, source not stated (probable holotype B; photos GH, US!).

Cheilanthes pyramidalis Fée, Mém. Fam. Foug. 7:38, pl. 25, fig. 3. 1857. —Syntypes: Mexico. "vallis Mexicana," *Schaffner 88*; "San Agostin," *Schaffner 305*; "Guatimalpan, in montis dictis de las Cruces," *Schaffner 304* (not found at P; isosyntype of *Schaffner 305* at K!).

Pellaea angustifolia (H.B.K.) Baker var. *elongata* Rov., Pterid. Sur Mex. 130. 1909. —Type: Mexico, Chiapas, Mesa de Coapilla, *Rovirosa 1059* (PH, frag. US! photo US).

Illustration: Knobloch & Correll (1962:107).

Rhizome short-creeping to suberect; fronds mostly 25–75 cm long, with stipe 1–2 times longer than blade, atropurpureous to blackish, 1–3 mm diam., glabrous above the sparsely scaly base; blade 3 (infrequently 4)-pinnate at base, deltoid-lanceolate, ca. 2 times longer than wide; vernation circinate; lowermost pinnae the longest (to 10 cm), basiscopically developed; ultimate segments linear, often pendent, ca. 1 mm wide, to 30 mm long, at least more than 4 (up to 20) times longer than broad, the terminal segment of pinnae and pinnules often more than 10 times longer than broad; leaf tissue subcoriaceous with age, glabrous below, above with few to many short, conical, whitish, epidermal protuberances, these especially numerous near margins; indusia decurrent onto axes, densely fringed with whitish to tan glandular hairs to 0.5 mm long; spores 32 per sporangium, ca. 64 μm diam.; $2n$ = 87–90 (Dgo.).

In Pine-Oak and Pine-Oak-Liquidambar slopes, or in Montane Rain Forest, infrequently Evergreen Cloud Forest; common in Northern Highlands, Central Plateau, s Sierra Madre; 1600–2400 (2700) m. Nearly throughout Mex. (Chih., Dgo., Baja C.S., Qro., N.L., Sin., Jal., Cma., Nay., Hgo., Méx., Pue., Ver., Mich., D.F., Gro., Mlos., Tlax., Oax.), Guat., Salv., Nic., C.R. Chiapas Collections: *R 1059* (US); *T&L 41735* (DS); *GM 71*, pt. (DS); *GM s.n.* (P); *G 233* (K, PH); *JTM 1215* (US); *6857*; *6983*; *15073*; *22008*, pt.; *22395*; *22636*; *23085*; *27036*; *27195*; *27677*; *31857*; *31936*; *32002*; *32073*; *33465*; *40875*; *40996*.

Closely related to *C. marginata*, which see.

9. **Cheilanthes jamaicensis** Maxon, Contr. U.S. Natl. Herb. 24:51. 1922.

—Type: Jamaica, below Cinchona, *Harris 12905* (US).

Illustration: none found.

Rhizome short-creeping, apex with lanceolate, brownish scales with a blackish central stripe; fronds 10–35 cm long, with stipe 0.7–1.4 times blade length, ca. 1 mm diam., rachis densely scaly (glabrescent when old) with linear-lanceolate, ascending, stramineous scales ca. 2 mm long, 0.1 mm wide; vernation noncircinate; blade lanceolate, tripinnate at base, bipinnate-pinnatifid distally; lower pinnae stalked, mostly 2–3 cm long; ultimate segments constricted at base, elliptic, mostly 1–2 mm long, ca. 1 mm or less wide, terminal segment of pinnules slightly longer than lateral ones; costae and costules below with numerous narrow scales like those of rachis; leaf tissue below densely arachnoid-villous, hairs tan, obscuring leaf tissue, lamina above with scattered similar hairs; indusia narrow, slightly modified, whitish; spores large, globose, 32 per sporangium.

Rare, known from two localities in Chiapas, Pine-Oak Forest; edge of Central Depression, drier areas of Central Plateau; ca. 1000–2400 m. Eastern Mex. (Coah., N.L., Tam., S.L.P., Ver.); Jam., Hisp. Chiapas Collections: *GM 45* (DS); *40736*.

This is very closely related to *C. tomentosa* Link but differs in its more numerous, lighter colored, stiffer, flat, strongly ascending (appressed) scales on the rachis; the rachis and lamina are not as densely hairy as in *C. tomentosa*. *Cheilanthes tomentosa* is a common species in southeastern United States, Arizona, New Mexico, and northern Mexico (Tam., N.L., Chih., Son.).

Rovirosa (Pterid. Sur Mex. 127. 1909) cited a collection from Chiapas (*R 968*) that may be this species; I have not seen this specimen.

10. **Cheilanthes kaulfussii** Kunze, Linnaea 13: 145. 1839.

—Type: based on *C. viscosa* Link, Hort. Reg. Bot. Berol. 2:43, 1833 (not Carm., 1818), described from cultivated specimens, original source said to be Mexico (presumably B; possibly authentic specimen BM!, "clt. in Hort. Lips., dedit Kunze, 1840").

Cheilanthes glandulifera Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:258. 1849. —Type: Mexico, Oaxaca, "inter Talea et Hac. de Sta. Gertrudes," *Liebmann* [Liebm. Pl. Mex. 2354] (C—2 sheets! isotype K!). I choose as lectotype the C sheet with Prantl's annotation.

ILLUSTRATIONS: Knobloch & Correll (1962:99); Correll, Ferns Tex. pl. 16. 1956.

Rhizome short-creeping, compact, clothed with atropurpureous to blackish, glossy, subulate scales; fronds mostly 15–30 (40) cm long, with stipe 2–5 times longer than blade, ca. 1 mm diam., atropurpureous, lustrous, glandular-hairy; vernation circinate; rachis also atropurpureous with whitish to tan, flattened, glandular-capitate hairs to 0.5 mm long; blade ± pentagonal, 3–4-pinnate, mostly 3–7 cm long, about as broad as long, lowermost pinnae much the largest, strongly basiscopically developed; leaf tissue on both sides densely viscid-glandular, without scales; indusia consisting of the slightly modified, reflexed whitish termination of ultimate segments; spores 32 per sporangium, ca. 62 μm diam.

Rock crevices and rocky slopes (e.g., roadbanks) adjacent to Pine-Oak-Liquidambar or Pine-Oak forests, also Tropical Deciduous Forest and Seasonal Evergreen Forest; uncommon in Sierra Madre, Northern Highlands, edge of Central Depression; 900–1600 m. Central Tex. through Mex. (Chih., Son., Dgo., Sin., Qro., N.L., S.L.P., Méx., Mlos., D.F., Gto., Nay., Jal., Cma., Mich., Gro., Pue., Ver., Oax.), Guat., Hond., Nic., C.R.; S.A. (Col., Ven.). CHIAPAS COLLECTIONS: *21811*; *21973*; *28482*; *36736*.

11. **Cheilanthes lendigera** (Cav.) Swartz, Syn. Fil. 128, 318. 1806.

—*Pteris lendigera* Cav., Descr. Pl. 268. 1802. —SYNTYPES: "junto á Guaranda en el Reino de Quito, y de Ixmiquilpan en la Nueva-España," *Née s.n.* (MA?). See Dansk. Bot. Ark. 9(3):23, 1937, for discussion of type.

Cheilanthes lanuginosa Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):75, pl. 20, fig. 2. 1842. —TYPE: Mexico, "près de Moran et de Real Del Monte," *Galeotti 6450* (BR! isotypes BR!).

Cheilanthes minor Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):75, pl. 21, fig. 1. 1842. —TYPE: Mexico, Oaxaca, Río de Capulalpan, *Galeotti 6464* (BR!).

Myriopteris villosa Fée, Gen. Fil. 149, pl. 28, fig. 3. 1852. —TYPE: Mexico, *Galeotti 6478* (presumably P; isotypes BR—3 sheets!).

Myriopteris marsupianthes Fée, Gen. Fil. 149, pl. 12A, fig. 1. 1852. —TYPE: Mexico, "Pic d'Orizaba," *Galeotti 6256* (presumably P; isotypes BR—4 sheets!).

ILLUSTRATION: Knobloch & Correll (1962:96).

Rhizome long-creeping, 1.5–3.0 mm diam., densely covered with tan to brown lanceolate scales; fronds mostly 20–35 (60) cm long, with stipe about two-thirds to slightly longer than blade, 1–2 mm diam., purplish brown, shining, densely hairy; vernation noncircinate; blade triangular-lanceolate, up to ca. 10 cm wide, 3–4-pinnate, pinnae to ca. 20 pairs, largest (basal) ca. 2 cm wide, slightly basiscopically developed on larger fronds; ultimate segments orbicular, ca. 1 mm broad and long; leaf tissue glabrous or nearly so above, below with dense tan hairs especially on axes; indusia very broad, whitish, often projecting perpendicularly to plane of blade, continuous all around segments; spores 64 per sporangium, ca. 49 μm diam.; $2n$ = ca. 109 ± 3 (116?).

On rocks (e.g., rocky road banks) in or adjacent to Evergreen Cloud Forest, Montane Rain Forest; uncommon on higher peaks of the Central Plateau, s Sierra Madre; 2100–3000 m. Western Tex. and s Ariz. through w and s Mex. (Chih., Dgo., Son., Sin., Gto., Qro., Tlax., Jal., Méx., D.F., S.L.P., Hgo., Mich., Ver., Pue., Oax.), Guat., Nic., C.R.; S.A. (Ven., Col., Ecu.); Hisp. CHIAPAS COLLECTIONS: *GM 2* (DS); *22085*; *22826*; *31726*; *32042*; *40470*; *41632*.

Reeves (in litt., 1978) noted that a few collections of *C. lendigera* from the states of Tlaxcala, México, and Puebla, and from Ecuador are densely scaly on the rachis. A single Chiapas collection (*32042*) has a few very narrow rachis "scales" (mixed with hairs) that are two cells wide at the base and taper to a hair tip; other Chiapas collections have only hairs on the rachis.

12. **Cheilanthes marginata** H.B.K., Nov. Gen. et Sp. 1:22. 1815; 7:pl. 669. 1825.

—TYPE: Ecuador, Quito, "prope Penipe," *Humboldt & Bonpland s.n.* (P!; photos BM! GH).

ILLUSTRATIONS: Tryon, Contr. Gray Herb. 194:101. 1964; Vareschi, Fl. Venez. 1(2):pl. 133. 1969.

Rhizome short-creeping to suberect; fronds mostly (8) 15–25 cm long, with stipe 1–2.5 times longer than blade, 1–2 mm diam., dark reddish brown, glabrous above the sparsely scaly base; blade broadly deltoid, about as broad as long, 3-pinnate to often 4-pinnate at base, lowermost pinnae much the largest, basiscopically developed; ultimate segments oval to linear, not usually pendent, rounded at tip, ca. 1 mm broad, mostly 2–4 mm long, terminal segment of pinnae and pinnules not more than 4 times longer than broad; leaf tissue glabrous on both sides; indusia continuous around ultimate segments, subentire to fringed with very short (0.1 mm) whitish to yellowish-tan glandular projections.

Slopes and at base of rocks in Evergreen Cloud Forest; uncommon on higher peaks of Central Plateau, s Sierra Madre; 2600–3500 m. Distribution uncertain, but probably s Mex. (Ver., Oax.?), Guat., Hond., Nic., C.R.; S.A. (Ven. to Bol., NW Arg.). CHIAPAS COLLECTIONS: *G 285* (K, YU); *GM 71*, pt. (DS); *15267*; *22008*, pt.; *22067*; *22764*; *29397*; *40347*; *42745*.

Very closely related to *C. hirsuta*, but in Chiapas, seemingly well-separated by the key characters (couplet g); also growing at higher elevations in Chiapas, always in Evergreen Cloud Forest. Two collections are mixed, indicating that the two species apparently grow together on occasion. These two collections illustrate well the differences in indusial pubescence and segment shape characteristic of the two species.

13a. **Cheilanthes microphylla** var. **microphylla**

Cheilanthes microphylla (Swartz) Swartz, Syn. Fil. 127. 1806. —*Adiantum microphyllum* Swartz, Prodr. Veg. Ind. Occ. 135. 1788. —TYPE: Jamaica, *Swartz s.n.* (S; probable isotype BM!).

ILLUSTRATIONS: Knobloch & Correll (1962:86); Proctor, Fl. L. Antilles 2:177. 1977.

Rhizome short- to long-creeping, clothed with linear-lanceolate, tan, concolorous scales; fronds mostly 15–40 (60) cm long, with stipe 0.5–0.8 (1.0) times as long as blade, ca. 1 (2.5) mm diam., purplish black, shining, with scales at base like those of rhizome, glabrous or glabrescent distally; vernation noncircinate; rachis with tan jointed hairs to 1 mm long and a few linear-lanceolate hairlike scales; blade lanceolate, bipinnate-pinnatifid to tripinnate at base, mostly 5–10 cm broad; pinnae ± equilateral, lowest the largest or nearly so; ultimate segments oblong, usually obtuse at apex, sessile at the oblique base, to 10 mm long, 3.5 mm wide, subentire to crenulate to deeply few-lobed; leaf tissue glabrous or nearly so above, below with scattered to numerous whitish, crinkly hairs 0.1–0.2 mm long; indusia narrow, whitish, entire or minutely erose, or with a few minute whitish-glandular hairs less than 0.1 mm long; spores 64 per sporangium, ca. 36 μm diam.; n = ca. 58 (Jam.), $2n$ = 116 (Fla.); n = 87 (S.L.P.), probably based on a misidentification (Reeves, in litt.).

Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest, on second growth slopes; uncommon in Northern Highlands, NE edge of Central Plateau, Central Depression; 800–1350 m. Texas, Mex. (N.L., Tam., Coah., Chih., Zac., Dgo., Son., S.L.P., Ver., Pue., Oax.); S.A.? (see discussion that follows); Fla., Antill. CHIAPAS COLLECTIONS: *GM s.n.* (DS); *20328*; *21904*; *22228*; *32539*; *40605*.

Cheilanthes moritziana Kunze [lectotype from Venezuela, *Moritz 263* (B; isolectotypes BM! GH), chosen by Tryon, Contr. Gray Herb. 194:98. 1964] is very closely related to *C. microphylla* and may prove to be conspecific; according to Tryon, it is distributed from Venezuela and Colombia to Bolivia. Specimens I have seen from Peru and Galápagos are indistinguishable from Mexican collections.

13b. **Cheilanthes microphylla** var. **fimbriata** A. R. Smith, Amer. Fern J. 70:19, figs. 9–10. 1980.

—TYPE: Mexico, Chiapas, Munic. Frontera Comalapa, 6–8 km E of Frontera Comalapa, *Breedlove 39018* (DS!).
ILLUSTRATION: only the original.

Differs from var. *microphylla* in the indusia fringed with whitish, jointed hairs up to 0.5 mm long, in the more numerous jointed whitish trichomes on the leaf tissue above (these trichomes flexuous or often somewhat thickened and stiff), in the generally smaller, bipinnate, subdimorphic blades, and in the short-creeping, more compact rhizome.

On rocks, apparently more common than the type variety in Chiapas, in Tropical Deciduous Forest, slopes with oak, *Cnidoscolus*; scattered in Central Depression and margins; 700–1000 m. Numerous collections from Yuc., also Oax. and Guat. (Petén). CHIAPAS COLLECTIONS: *R 971*, pt. (PH); *GM 184* (DS); *GM s.n.* (DS); *26976*; *36556*; *37838*; *39018* (type).

14. **Cheilanthes notholaenoides** (Desv.) Maxon ex Weatherby, Contr. Gray Herb. 114:34. 1936.

—*Pteris notholaenoides* Desv., Mém. Soc. Linn. Paris 6:299. 1827. —TYPE: "Hispaniola," collector not stated (P! photo GH).
Cheilanthes aspidioides Fée, Gen. Fil. 157. 1852. —TYPE: Mexico, Oaxaca, San Pedro Nolasco, *Galeotti 6557* (presumably P; isotypes BR!—2 sheets).
ILLUSTRATIONS: Knobloch & Correll (1962:90); Tryon, Contr. Gray Herb. 194:95. 1964; Vareschi, Fl. Venez. 1(2):pl. 133. 1969.

Rhizome short- to occasionally long-creeping, clothed with tan to brownish, linear-lanceolate, entire-margined scales; fronds 10–40 (50) cm long, with stipe ⅓–½ (⅔) as long as blade, 1–2.5 mm wide, blackish, shining but often partly obscured by appressed, linear-lanceolate, tan, hairlike scales; rachis like the stipe; vernation noncircinate; blade linear-lanceolate, bipinnate or with some pinnules on lower pinnae with a single free or nearly free acroscopic lobe (rarely up to 3 pairs of lobes); pinnae 10–20 pairs, nearly always equilateral; pinnules oblong, rounded at tip, very short-stalked; leaf tissue subcoriaceous, glabrous on both sides or below with a few minute whitish, crinkly hairs 0.1–0.2 mm long, these most numerous near costules; reflexed segment margin only slightly modified, whitish to tan, continuous around pinnules, entire; spores globose, 32 per sporangium; $n = 87$ (Oax.), 87–90 (Hgo.).

In Pine-Oak and Pine-Oak-Liquidambar forests, infrequently Seasonal Evergreen Forest, Evergreen Cloud Forest; common in Central Plateau, Northern Highlands (especially Jitotol Ridge), widely scattered in Sierra Madre; 1000–2700 m. Nearly throughout Mex. (Chih., Coah., Tam., S.L.P., Zac., Pue., Hgo., D.F., Gro., Oax., Ver., Méx.); Guat; S.A. (Ven., Peru, NW Arg.); Jam., Hisp. CHIAPAS COLLECTIONS: *JTM 1213* (US); *C&D 130* (US); *L&S 9867* (US); *G 234* (K, PH); *A 1312* (DS, UC); *A 1334* (UC); *GM 63* (DS); *EM 5569* (MEXU, DS); *Ho 2* (US); *R&R&M 111* (US); *R 971*, pt. (PH); *T&L 41307* (DS); *T&L 41353* (DS); *6453*; *14022*; *21408*; *22391*; *22916*; *23255*; *26398*; *29506*; *31446*; *32304*; *32747*; *33757*; *34679*; *39907*; *40715*; *40997*; *41328*; *41811*; *42041*.

This species is often confused with *C. microphylla* but can be distinguished by the thicker, more coriaceous leaf texture, pinnules usually entire or with a single acroscopic lobe, and fewer (or absence of) whitish hairs on leaf tissue below. Also, *C. notholaenoides* has 32 large spores per sporangium, while *C. microphylla* has 64 smaller spores per sporangium. In Chiapas, the two species apparently do not grow together, *C. notholaenoides* invariably growing at higher elevations.

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Cheilanthes aurea Bak. —known from Edo. Méx., Oax.; Guat., and Salv. Blade pentagonal, basiscopically produced, covered with yellowish wax below. See *C. farinosa* for additional discussion.
Cheilanthes membranacea (Davenpt.) Maxon —Oax. Related to *C. cuneata* but with more finely dissected blade, smaller ultimate segments.
Cheilanthes myriophylla Desv. —Mexico (Chih. and S.L.P. to Oax.) to Arg. Distinguished from all other Chiapas species by the blade below with broad ovate scales that nearly obscure the sporangia.

21. CHEILOPLECTON

Cheiloplecton Fée, Mém. Fam. Foug. 7:33. 1857. —TYPE: *Pteris rigida* Swartz [≡*Cheiloplecton rigidum* (Swartz) Fée].

Rhizome short, bearing narrow scales at apex; blade 2-pinnate or more divided, ultimate segments rather large (not beadlike); veins raised below, free, repeatedly forking; leaf tissue subcoriaceous; sori marginal, continuous around margin of segments, covered by a reflexed indusium; indusia broad, tan, thick, corrugated; spores large, globose, with a trilete scar.

As usually circumscribed, a monotypic genus, but a possibly undescribed species is known from Mexico (*Cheiloplecton lanceolatum* C. C. Hall, ined., from Oax., Pue., Gro.); also, there is an undescribed South American (Ecu., Bol.) species that perhaps belongs here.

The relationships of *Cheiloplecton* are not certain. It is close to *Cheilanthes*, but its origin, if from *Cheilanthes*, is not obvious. Another possible affinity is with *Aleuritopteris*. It seems to have rather little to do with *Pellaea* or *Doryopteris*, where many people have placed it.

1. **Cheiloplecton rigidum** (Swartz) Fée, Mém. Fam. Foug. 7:34, pl. 20, fig. 3. 1857.

—*Pteris rigida* Swartz, Syn. Fil. 104, 299. 1806. —*Pellaea rigida* (Swartz) Hook., Sp. Fil. 2:144. 1858. —*Cheilanthes rigida* (Swartz) Mett., Abh. Senckenberg. Naturf. Ges. 3:92. 1859. —TYPE: Mexico, "Chalma, Novae Hispaniae" (p. 104), "Chalma, Regni Peruviae" (p. 299), *Née s.n.*

ILLUSTRATION: **Fig. 25.**

Rhizome short-creeping to suberect, apex with numerous, narrowly lanceolate, tan (black with age), concolorous scales ca. 5 mm long; fronds mostly 15–40 cm long, to ca. 25 cm broad, with stipe half to about equaling blade length, atropurpureous, shining but partially obscured by persistent, tan, lanceolate, patent scales to ca. 5 mm long, also with shorter, flexuous, hyaline, septate hairs; blade deltoid, bipinnate-pinnatifid to nearly tripinnate at base, deeply pinnatifid at apex; lowermost pinnae largest, to ca. 15 cm long, 9 cm broad, ascending, inequilateral, basiscopic pinnules longer than acroscopic ones, distal pinnae increasingly equilateral; larger pinnules subpinnate, with lanceolate, adnate segments to 2 cm long, 6 mm broad, rounded in sterile segments, acutish in fertile segments; axes below with tan, fibrillose scales mostly 2–3 mm long, also with flexuous septate hairs, such hairs also present on veins and leaf tissue (both sides); indusia ca. 1 mm broad.

Terrestrial, also on rocks and canyon walls, adjacent to Seasonal Evergreen Forest, tropical Deciduous Forest, secondary growth; common in Central Depression and adjacent areas in the Central Plateau and Northern Highlands; 300–1550 m. Mexico (Cma., Jal., Gro., Mich., Hgo., S.L.P., Méx., Mlos., Pue., Ver., Oax.), Guat., Salv. CHIAPAS COLLECTIONS: *GM 18* (DS); *GM 68* (DS); *G 220* (K); *R&R&M 985* (US); *14476*; *20141*; *21541*; *22955*; *26234*; *27278*; *27380*; *27998*; *36530*; *36537*; *37163*; *37990*; *39640*; *39846*; *40488*.

22. CIBOTIUM

Cibotium Kaulf., Berlin. Jahrb. Pharm. Verbundenen Wiss. 21:53. 1820. —TYPE: *Cibotium chamissoi* Kaulf.

Stem stout, prostrate to suberect (to ca. 1 m tall), not forming a long, vertical trunk; stem apex and stipe base very densely long-hairy, the hairs septate, scales absent; fronds very large, 2-pinnate-pinnatifid to 3-pinnate; veins free, 1–3-forked; leaf tissue below white-waxy or greenish, without hairs; sori marginal; indusia bivalvate, the two valves unequal, the inner narrower and tonguelike, the valves thick, whitish to tan (both valves of a different color and texture from leaf tissue); spores tetrahedral, with a trilete scar; $x = 68$.

According to Copeland (1947), *Cibotium* comprises four similar species in southern Mexico and Central America, three or four in Hawaii, and one to three in eastern Asia (Java to China). Species of *Cibotium* occur in middle elevation rain forests in the New World. *Cibotium* has its affinities in the dicksonioid ferns, perhaps with *Dicksonia* and *Culcita*.

REFERENCE: MAXON, W. R. 1912. Studies of tropical American ferns—No. 3. Contr. U.S. Natl. Herb. 16:54–58 [*Cibotium*].

Costae glabrous or readily glabrescent; leaf tissue usually conspicuously white-waxy below .... 1. *C. regale*
Costae densely hairy with long, persistent, antrorse hairs; leaf tissue not obviously white-waxy below .... 2. *C. wendlandii*

1. **Cibotium regale** Versch. & Lemaire, Ill. Hort. 15:under pl. 548, fig. 5. 1868.

—*Dicksonia regalis* (Versch. & Lemaire) Baker *in* Hook. & Bak., Syn. Fil., ed. 2, 461. 1874. —TYPE: described from cultivated specimens, originally collected in Mexico, Chiapas, *Ghiesbreght 351* ("isotypes" at K! PH!).

ILLUSTRATIONS: **Fig. 26**; Maxon (1912:pl. 31); Stolze, Fieldiana, Bot. 39:95. 1976.

Similar to *C. wendlandii* but differing from that species by the hairs on costae and costules below not so numerous, mostly lost with age, all whitish; leaf tissue below usually glaucous or white-waxy; segments slightly broader (3.0–3.5 mm) and acute at tip.

In Montane Rain Forest, Pine-Oak-Liquidamber Forest; uncommon in Northern Highlands, N Sierra Madre; 1350–1600 m. Known with certainty only from Chis., Guat., and Hond. CHIAPAS COLLECTIONS: *G 351* (K, PH); *P 9195* (UC); *21761*; *32516*.

The species of *Cibotium* are not clear-cut, and it is possible that all four currently recognized American species represent only variants of a single species; the differences seem to be primarily ones of degree and not of substance. The collections are so few, however, that it is difficult to assess the importance of the variation. Stolze (Fieldiana, Bot. 39:96. 1976) has chosen to synonymize *C. wendlandii* and *C. guatemalense* under *C. regale*.

2. **Cibotium wendlandii** Mett. ex Kuhn, Linnaea 36:151. 1869.

—*Dicksonia wendlandii* (Mett. ex Kuhn) Baker *in* Hook. & Bak., Syn. Fil. ed. 2, 460. 1874. —TYPE: Guatemala, *Wendland s.n.* (B).

ILLUSTRATIONS: Maxon (1912:pl. 32, figs. a–e); Hooker, Sp. Fil. 1:pl. 30A. 1844 (as *C. schiedei*).

Stipe base scales golden-brown; fronds to 4 m long; pinnae to ca. 75 cm long, 30 cm broad, with basal pinnules somewhat shortened; larger pinnules to 18 cm long, 2 cm broad, inequilateral, segments of acroscopic side longer and less oblique than those of basiscopic side, deeply incised to nearly the costule or with a few free basal segments; segments lanceolate, 2–3 mm broad, acute to apiculate at tip; veins to ca. 10 pairs per segment; costae and costules below densely and persistently long-hairy, the hairs adpressed, twisted, mostly whitish, a few reddish or with a reddish tip; leaf tissue green below, without white wax; sori not extended beyond margin in the plane of the frond, to ca. 8 pairs per segment.

In Montane Rain Forest; rare in S Sierra Madre; 2200 m.

Known only from Chis. and Guat. CHIAPAS COLLECTION: *31656*.

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Cibotium guatemalense Reichenb. ex Kuhn —known only from Guatemala and Nicaragua. Distinguished from *C. regale* by the blade tripinnate or subtripinnate; veins 8–15 pairs per segment; segments narrower. From *C. wendlandii,* differing by glabrous or glabrescent costae and costules below and white-waxy leaf tissue below.

Cibotium schiedei Schlecht. & Cham. —known with certainty only from Ver. and Oax. Distinguished from other American species of *Cibotium* by the sori distant, usually extending beyond margin in the plane of the segment; from *C. wendlandii,* also differing by glabrous or glabrescent costae and costules below and by white-waxy leaf tissue below.

23. CNEMIDARIA

Cnemidaria Presl, Tent. Pterid. 56. 1836. —TYPE: *Cnemidaria speciosa* Presl. See Stolze (1974) for additional synonymy.

Caudex ascending to erect, rudimentary to 1.5 m long; stipe smooth to muricate, or with corticinate spines to 7 mm long, lacking trichomes; stipe base scales generally appressed, commonly bicolorous with a dark brown median stripe and a whitish margin, marginal cells differentiated from those of central portion also in shape and orientation; fronds large, to 3.5 m long; blade pinnate to pinnate-pinnatisect (never fully bipinnate); costae and costules above glabrous, below with pluricellular trichomes to glabrous; basal adjacent veins forming costal areoles, or strongly connivent to sinus; indusia present, hemitelioid (saucer-shaped); spores trilete, with one large pore near center of each face on or near equator; $x = 69$.

A Neotropical genus of 23 species, from southern Mexico (Oax.) to Bolivia (1 sp.), French Guiana (2 spp.) and southeastern Brazil (1 sp.); Antilles (2 spp.). Most species are in lower to middle elevation rain forests from Costa Rica (3 spp.) to Colombia (9 spp.), Venezuela (6 spp.), and Peru (5 spp.).

REFERENCE: STOLZE, R. 1974. A taxonomic revision of the genus *Cnemidaria* (Cyatheaceae). Fieldiana, Bot. 37:1–98.

1. **Cnemidaria decurrens** (Liebm.) Tryon, Contr. Gray Herb. 200:52. 1970.

—*Hemitelia decurrens* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:286. 1849. —LECTOTYPE (chosen by Stolze, 1974): Mexico, Oaxaca, Distr. Chinantla, Lobani, *Liebmann* [Liebm. Pl. Mex. 2089, Fl. Mex. 912] (C!); isolectotype C! (Liebm. Pl. Mex. 2089, Fl. Mex. 913); fragm. US.

For additional synonymy, see Stolze, 1974.

ILLUSTRATION: **Fig. 27**; Stolze (1974:76, venation); Stolze, Fieldiana, Bot. 39:107. 1976.

Caudex to 0.3 m long; fronds to 2.5 m long, 0.8 m broad, gradually reduced toward apex; stipe to 0.5 m long, with spines to 2 mm long; rachis with wings to 2 mm wide running partially to fully down each side or (rarely) lacking; pinnae subsessile, rounded to truncate at base, subentire or crenate or cut one-third to costae, basal ones scarcely or not at all reduced and deflexed; costae below with broad, amorphous, pale to whitish or bicolorous, scattered scales, epilose; costules lacking scales and trichomes; segments (when present) obtuse to rarely subapiculate; veins simple, basal ones merging to form costal areoles, basal basiscopic ones arising from costule; sori in a single medial to inframedial row; indusia pale to yellowish brown, semicircular to (rarely) almost circular, subentire.

Known in Chiapas from a single collection, near Palenque, without habitat data; 200–1100 m. Elsewhere from Oax., Guat., Hond. CHIAPAS COLLECTION: *GM 4* (DS, US).

Cnemidaria apiculata (Hook.) Stolze is known only from the state of Oaxaca, occurring in montane rain forests on the Atlantic slope between 1200–1600 m. It can be distinguished from *C. decurrens* by the basal veins connivent to the sinus, submarginal soral line, and pinna segments cuspidate, falcate, the basal pair commonly overlapping the rachis.

24. COCHLIDIUM

Cochlidium Kaulf., Berlin. Jahrb. Pharm. Verbundenen Wiss. 21:36. 1820. —TYPE: *Grammitis graminoides* Swartz [≡*Cochlidium graminoides* (Swartz) Kaulf.].

Xiphopteris Kaulf., Berlin. Jahrb. Pharm. Verbundenen Wiss. 21:35. 1820. —LECTOTYPE (chosen by J. Smith, Hist. Fil. 179. 1875): *Acrostichum serrulatum* Swartz [≡*Xiphopteris serrulata* (Swartz) Kaulf.].

For additional synonymy, see Bishop (1978).

Small epiphytes; rhizome creeping to usually erect, with 1–3 vascular bundles, each with a straight or slightly arcuate row of tracheids (cross section); rhizome apex scales linear-lanceolate, tan, concolorous, ± entire; fronds fasciculate, subsessile, not articulate, linear, simple or occasionally furcate, the fertile lamina entire or at most sinuate; blade firm, chartaceous to subcoriaceous, glabrous or with scattered 2–8-celled hairs, these frequently somewhat catenate; veins immersed, not easily seen, often ending in hydathodes above, simple or furcate and sometimes united to form costal areoles without free veinlets; sori linear, consisting of a line of sporangia borne closely against costa at either side, the double line early confluent, immersed or superficial, or the sori intermittent or round and discrete in some species, exindusiate; paraphyses absent; sporangia glabrous; spores globose-tetrahedral, without perispore, greenish.

According to Bishop (1978), *Cochlidium* comprises 16 Neotropical species. In recent years, several of the species, including *C. serrulatum,* have been included in *Grammitis* s.l. or in the segregate genus *Xiphopteris,* but Bishop has clarified their true affinities. Two species of *Cochlidium* are known from Mexico, with a third, *C. linearifolium,* possibly to be expected at low elevations in the Eastern Highlands. The greatest diversity of species occurs in Venezuela (8 spp.) and the West Indies (8 spp.). Species of *Cochlidium* grow in very wet montane rain forests.

References: Christensen, C. 1929. Revision of the polypodioid genera with longitudinal coenosori (Cochlidiinae and "Drymoglossinae"); with a discussion of their phylogeny. Dansk. Bot. Ark. 6(3):1–93; Bishop, L. E. 1978. Revision of the genus *Cochlidium* (Grammitidaceae). Amer. Fern J. 68:76–94.

Sori compound, the receptacles linearly confluent and closely parallel to costa; fronds all with entire blade ... 1. *C. rostratum*
Sori separate, oval, usually confluent at maturity but with discrete receptacles easily visible with the sporangia removed; sterile fronds and sterile portions of fertile fronds distinctly serrate .... 2. *C. serrulatum*

1. **Cochlidium rostratum** (Hook.) Maxon ex C. Chr., Dansk. Bot. Ark. 6(3):23. 1929.

—*Monogramme rostrata* Hook., Sp. Fil. 5:122, pl. 288B. 1864. —Type: Nicaragua, Omotepee [Omotepec], *C. Wright s.n.* (K; isotype US).

For additional synonymy, see Bishop (1978:88).

Illustrations: **Fig. 28**; see original; also Christensen (1929:pl. 1, figs. 5–6).

Fronds mostly 3–20 cm long, (0.5) 1.5–3.0 mm broad, usually conduplicate, falcate at tip; leaf tissue subcoriaceous; veins simple or forked, ascending and then curved, terminating in indistinct hydathodes; coenosori in deeply sunken grooves, margins of grooves often produced and partially concealing sporangia.

Epiphytic in Montane Rain Forest, Evergreen Cloud Forest; uncommon and widely scattered in cen. Sierra Madre, Northern Highlands (Jitotol Ridge), E edge of Central Plateau; 1300–2300 m. Southern Mex. (Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Ven., Col.); Cuba, Jam., Hisp., Guadeloupe. Chiapas Collections: *25418*; *30161*; *32226*; *32639*; *33580*; *35108*; *36965*; *38888*.

Cochlidium rostratum is closely related to, and perhaps not distinct from, *C. linearifolium* (Desv.) Maxon ex C. Chr. (type from Fr. Gui.), which occurs in the Antilles, Central America (Belize and Guatemala southward), and northern South America. The latter presumably differs in having more prominent hydathodes, smaller sporangial capsules (less than 250 μm long vs. greater than 250 μm), smaller spores (less than 43 μm diam. vs. greater than 43 μm), and distal annulus cells less than 45 μm high (vs. greater than 45 μm high in *C. rostratum*). In addition, *C. linearifolium* generally grows at lower elevations (below 800 m) than does *C. rostratum* (700–2600 m) (Bishop, 1978). If the two species prove to be the same, *C. linearifolium* has priority.

Pleurogramme myrtillifolia Fée (Mém. Fam. Foug. 3:38. 1852), attributed to Mexico with a query, is most likely not a Mexican species (see Bishop, 1978:94).

2. **Cochlidium serrulatum** (Swartz) L. E. Bishop, Amer. Fern J. 68:80. 1978.

—*Acrostichum serrulatum* Swartz, Prodr. Veg. Ind. Occ. 128. 1788. —*Grammitis serrulata* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):18. "1801" [1802]. —*Xiphopteris serrulata* (Swartz) Kaulf., Enum. Fil. 300. 1824. —*Polypodium duale* Maxon, Contr. U.S. Natl. Herb. 16:61. 1912. —Type: Jamaica, *Swartz s.n.* (isotypes BM! B—Herb. Willd. 19589, US).

For additional synonymy, see Bishop (1978:80).

Illustrations: Copeland, Amer. Fern J. 42:50, pl. 3A. 1952; Vareschi, Fl. Venez. 1(2):pl. 179. 1969; Proctor, Fl. L. Antill. 2:354. 1977.

Rhizome suberect to erect, often somewhat elongate, filiform (0.2–0.5 mm diam.), bearing small ovate, tan, glabrous, appressed scales ca. 0.5 mm long, nearly as wide; fronds numerous, caespitose, mostly 1–4 (10) cm long and 1–3 mm broad, without a distinct stipe; blade sharply serrulate nearly to midrib in proximal (sterile) half, entire in distal (fertile) half, some fronds completely fertile, elongate, conduplicate at maturity, linear, other fronds sterile, shorter, serrulate to tip; segments with costae simple, unbranched, blackened below; sporangia glabrous, borne at base of veins, confluent when very young, thus appearing to form a single line; n = ca. 74 II, ca. 148 I (Jam.), 74 (Braz.).

Epiphyte on mossy tree trunks, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; widely scattered but locally common in Eastern and Northern highlands, and especially SE Central Plateau (vicinity of Lagos de Monte Bello); 800–1350 m. Southern Mex. (Pue., Oax., Ver.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., S Braz.); Antill., Trin., Tob.; trop. Afr., Madag., Mauritius. Chiapas Collections: *GM s.n.* (UC); *Dr 1641* (MEXU, NY, UC, US); *29553*; *29622*; *30807*; *31535*; *32118*; *32229*; *32522*; *32914*; *35119*; *36968*.

25. CTENITIS

Ctenitis (C. Chr.) C. Chr. *in* Verdoorn, Man. Pterid. 544. 1938. —*Dryopteris* Adanson subg. *Ctenitis* C. Chr., Biol. Arb. til. E. Warming 77. 1911. —Type: *Aspidium ctenitis* Link [=*Ctenitis distans* (Brack.) Ching].

Terrestrial, occasionally epipetric; rhizome short, erect to obliquely erect (rarely creeping), scaly, fronds fasciculate; stipe with numerous vascular bundles arranged in a ring (cross section); fronds pinnate-pinnatifid to decompound, typically catadromous, the blade usually herbaceous to chartaceous; aerophores and gemmiferous buds absent; axes above (and sometimes below) furnished with dense articulate reddish hairs (*Ctenitis*-hairs: 2–4 short cylindrical cells separated by thick reddish walls) or antrorsely strigose with whitish pluricellular hairs; rachis and costae beneath sparsely to often densely scaly, the scales sometimes bullate and/or clathrate; veins free, simple or forked; sori dorsal on veins; indusia round-reniform, sometimes wanting or minute; spores bilateral, with an echinulate epispore; $x = 41$.

Pantropical, with perhaps 150 species, about half of which are found in the Neotropics. Twenty-one species are known from Mexico (mostly Oaxaca, Veracruz, Chiapas) and 20 of these have been found in Chiapas. Centers of evolution in the New World are the Greater Antilles, Chiapas-Guatemala, and southern Brazil. Many species are calcicolous. Primarily a genus of low and middle elevation rain forests.

REFERENCES: CHRISTENSEN, C. 1913. A monograph of the genus *Dryopteris*. Part I. The tropical American pinnatifid-bipinnatifid species. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:55–282; Part II. The tropical American bipinnate-decompound species. Op. cit. (8)6:1–132. 1920.

a. Costae and costules above strigose with antrorse, subulate, often falcate hairs (>0.5 mm long); indusia absent; scales toothed at margin (group of *C. subincisa*).

b. Blade tripinnate-pinnatifid at base, tripinnate to bipinnate-pinnatifid distally; tertiary segments of middle pinnae entire or faintly crenate or serrate; pinnae mostly alternate, ascending.

c. Scales of stipe, rachis, and costae below ovate, entire; costae, costules, and veins below with long, flexuous, pluricellular hairs 1–2 mm long .... 12. *C. pansamalensis*

cc. Scales of stipe, rachis, and costae below linear to lanceolate, toothed; costae, costules, and veins below glabrous or with short, acicular, unicellular hairs 0.1–0.2 mm long .... 17. *C. subincisa*

bb. Blade tripinnate-pinnatifid; tertiary segments of middle pinnae at least pinnatifidly lobed; basal pinnae opposite or subopposite, perpendicular to rachis .... 13. *C. pulverulenta*

aa. All hairs short (<0.5 mm long), articulate, reddish *Ctenitis*-hairs; indusia present or absent; scales with margin entire or nearly so.

d. Blade pinnate-pinnatifid to bipinnate, if bipinnate then pinnules entire, serrate, or crenate at margin, never cut more than half their width.

e. Indusia present.

f. Costae, indusia, and leaf tissue below glandular-pubescent.

g. Costal scales strongly bullate; blade bipinnate at base, pinnules crenate or serrate ..... 2. *C. bullata*

gg. Costal scales not bullate, flat; blade deeply pinnate-pinnatifid at base, segments entire .... 18. *C. submarginalis*

ff. Costae, indusia, and leaf tissue below without glandular hairs.

h. Veins reaching margin; segments entire or minutely denticulate toward apex; costal scales not bullate .... 19. *C. thelypteroides*

hh. Veins not reaching margin; segments serrate or obtusely lobed; costal scales bullate.

i. Blade bipinnate at base, pinnules obtusely lobed; costal scales blackish, strongly clathrate .... 9. *C. lanceolata*

ii. Blade merely deeply pinnate-pinnatifid with serrately incised pinnules; costal scales tan, not strongly clathrate .... 15. *C. salvinii*

ee. Indusia absent.

j. Costal scales reddish, flat, lanceolate; segments ± entire, rounded to truncate at apex.

k. Pinnae incised ⅓–½; rachis and costae below with dense, spreading, stiff scales .... 14. *C. refulgens*

kk. Pinnae incised ¾ or more; rachis and costae below with scattered, ± appressed, lax scales .... 18. *C. submarginalis*

jj. Costal scales subbullate to bullate, or with an expanded, subclathrate base and darkened, subulate tip; segments often toothed toward tip, acutish to mucronate at apex.

l. Sori medial; rhizome short-creeping, fronds not fasciculate; lowermost pinnae not deflexed; tubular yellowish appressed glands often on leaf tissue below; pinna segments separated by a wide sinus .... 11. *C. nigrovenia*

ll. Sori inframedial; rhizome suberect, fronds fasciculate; lowermost pinnae deflexed; tubular yellowish glands absent or sparse on leaf tissue below; pinna segments approximate or imbricate .... 1. *C. baulensis*

dd. Blade bipinnate-pinnatifid (at least in part) to decompound.

m. Costal scales decidedly bullate (group of *C. hirta*).

n. Indusia absent; only lowermost pair of pinnae pinnate-pinnatifid, more distal pinnae deeply pinnatifid (blades ± tripartite) .... 7. *C. hemsleyana*

nn. Indusia present, large, persistent; many pairs of pinnae pinnate-pinnatifid.

o. Stipe and rachis very densely scaly; indusia uniformly tan, or slightly darkened toward center .... 20. *C. ursina*

oo. Stipe and rachis moderately scaly; indusia with a much darkened (almost blackish) center .... 10. *C. melanosticta*

mm. Costal scales flat.

p. Blade small, shorter than 25 cm; indusia absent; blade densely glandular above and below .... 3. *C. chiapasensis*

pp. Blade large, usually longer than 50 cm; indusia present or absent; blade glandular or eglandular.

q. Stipe and rachis with crinite, dark brownish, hairlike, patent or retrorse scales; costal scales uniformly castaneous; indusia large, persistent, ciliate-glandular .... 6. *C. grisebachii*

qq. Stipe and rachis scaly, the scales thin, reddish to somewhat darkened, lax, those of stipe base forming a large woolly tuft; indusia usually small and fugacious, or absent (group of *C. sloanei*).

  r. Lowermost pinnae not or only slightly basiscopically produced; costal scales not aggregated in pinna axils, tan, not clathrate, not vaulted; distal pinnules strongly adnate and decurrent .... 8. *C. interjecta*

  rr. Lowermost pinnae strongly basiscopically produced; costal scales most numerous in pinna axils, tan to blackened, often clathrate and vaulted; distal pinnules not strongly adnate and decurrent.

    s. Segment margins eciliate; indusia absent; stipe base scales orangish, filiform; 200–800 (1350) m .... 5. *C. excelsa*

    ss. Segment margins ciliate; indusia present or absent; stipe base scales orangish to brown, filiform or linear-lanceolate.

      t. Scales of axils of pinnae tan to light reddish brown; rhizome and stipe base scales filiform, orangish .... 16. *C. sloanei*

      tt. Scales of axils of pinnae brown or nearly black (without magnification); rhizome scales linear-lanceolate, brown; 1350–2300 m .... 4. *C. equestris*

1. **Ctenitis baulensis** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:213, fig. 2, I–K. 1975.

—Type: Mexico, Chiapas, Munic. Cintalapa, 16 km NW of Rizo de Oro, SE of Cerro Baul, *Breedlove* (*with Smith*) *21812* (DS!).

Illustration: only the original.

Rhizome suberect, hidden by numerous old stipe bases, the caudices 2–3 cm diam.; fronds caespitose, stipe to 20 cm long, ca. 2 mm diam., darkened at base, stramineous or faintly greenish upwards, densely scaly, scales to 3 mm long, 1.5 mm broad, flattened to subbullate, tan (darkened toward attenuate tip); blade deeply pinnate-pinnatifid, to 20 cm long, 13 cm broad; pinnae up to ca. 10 pairs, sessile, largest 7 cm long, 2.5 cm broad, deeply incised nearly to costa; segments oblique, largest 12 mm long, 4.5 mm broad, entire to denticulate towards obtuse or slightly acute apex, approximate or even imbricate; basal pair of segments slightly reduced on lower pinnae; veins up to 9 pairs, reaching margin above sinus; costae below sparsely glandular, densely scaly, scales tan and strongly bullate at base, darkened and attenuate at tip, costae above with dense *Ctenitis*-hairs ca. 0.5 mm long; leaf tissue on both sides glabrous or below with sparse appressed glandular hairs; sori inframedial, exindusiate, up to 1 mm diam.

Shaded understory of Montane Rain Forest; uncommon in N Sierra Madre (Cerro Baul); 1600 m. Known only from the type locality. Chiapas Collections: *21812* (type); *31328*.

2. **Ctenitis bullata** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:213, fig. 2, E–H. 1975.

—Type: Mexico, Chiapas, Munic. La Trinitaria, Lagos de Monte Bello, *Breedlove 25339* (DS!).

Illustration: only the original.

Rhizome suberect, obscured by stipe bases and scales, caudex ca. 2.5 cm diam.; stipe to ca. 40 cm long, 4 mm diam., brownish, toward the base with patent or reflexed subulate scales to 1 cm long; rachis with scales similar to those of stipe but shorter; blade dark green, to ca. 45 cm long, 25 cm broad, bipinnate or bipinnate-pinnatifid at base, deeply pinnate-pinnatifid above; pinnae up to ca. 20 pairs, alternate or subopposite, widest at base, equilateral, to ca. 13 cm long, 3.3 cm broad, petiolulate to 6 mm, distal pinnae sessile; pinnules petiolulate to 1 mm, serrate or shallowly lobed, pinnules of more distal pinnae sessile, serrate or entire; veins up to 10 pairs, simple or forked, ending at margin; costae below with numerous bullate tan scales, long articulate hairs (to 0.7 mm), and short glandular hairs (ca. 0.1 mm); surface of blades above glandular, also with articulate hairs on costae and veins; sori inframedial, ca. 1 mm diam.; indusia persistent, rotund-reniform ca. 0.6–0.8 mm diam., glandular, tan, erose or glandulose-ciliate at margin.

Shaded understory, as in ravines or depressions, Montane Rain Forest; uncommon in SE Central Plateau (Lagos de Monte Bello); 1300–1600 m. Endemic to Chiapas. Chiapas Collections: *14968*; *22331*; *25339* (type).

Most closely related to *C. strigulosa* (Davenp.) Copel. (known by a few collections from Veracruz and Guatemala) but differing in its much larger size, presence of long articulate hairs, larger indusia, and costal scales decidedly more bullate.

3. **Ctenitis chiapasensis** (Christ) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:229. 1975.

—*Aspidium chiapasense* Christ, Bull. Herb. Boissier (2)5:727. 1905. —*Dryopteris chiapasensis* (Christ) C. Chr., Ind. Fil. 257. 1905. —Type: Mexico, Chiapas, Baduitz, *Münch 117* (P, not found; isotype DS!).

Illustration: **Fig. 29.**

Rhizome suberect, ca. 1.5 cm thick, clothed with castaneous, lanceolate, entire scales; fronds fasciculate, stipe 0.5–1.0 mm diam., to 15 cm long, stramineous to tan, base darkened and with scales similar to those of rhizome, scales scattered, lighter, and rather inconspicuous distally; rachis covered with *Ctenitis*-hairs ca. 0.3 mm long (hairs more numerous adaxially), cylindrical glands, and scattered lanceolate to ovate-lanceolate, tan, subclathrate, entire scales to ca. 2 mm long; blade herbaceous, deltoid-ovate, to 18 cm long, 12 cm broad, bipinnate-pinnatifid to nearly tripinnate below, becoming bipinnate and then pinnate-pinnatifid distally; pinnae 6–8 pairs, upcurved, lowermost longest, deltoid, to 8 cm long, 4.5 cm broad, petiolulate ca. 5 mm, basiscopically produced; middle pinnae equilateral, becoming sessile and then adnate distally; ultimate segments oblong, rounded at tip; costae and costules pilose above by *Ctenitis*-hairs to ca. 0.5 mm long, below with scattered scales like those of rachis, cylindrical-glandular, without or with very few *Ctenitis*-hairs; leaf tissue above and below with numerous yellowish cylindrical glands ca. 0.1 mm long and with *Ctenitis*-hairs along or near leaf margin above; veins mostly simple, occasionally forked, reaching margin; sori inframedial, exindusiate.

Known only from the type collection. There are traces of limestone on the rhizome of the isotype examined, so that the species may be calcicolous. Its nearest relative is perhaps *Dryopteris* (*Ctenitis*) *chiriquiana* C. Chr. from Panama and Costa Rica.

4a. **Ctenitis equestris** (Kunze) Ching, Sunyatsenia 5:250. 1940.

—*Aspidium equestre* Kunze, Linnaea 18:347. 1844. —*Dryopteris equestris* (Kunze) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:54. 1920. —TYPE: Mexico, *Leibold 42*.

Lastrea ciliata Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:273. 1849. —TYPE: Mexico, Veracruz, San Antonio Huatusco, *Liebmann* [Liebm. Pl. Mex. 2394] (C!—2 sheets, 1 folio).

Polypodium alsophiloides Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:208. 1849. —TYPE: Mexico, Oaxaca, "Trapiche de la Concepcion," *Liebmann* [Liebm. Pl. Mex. 2406, Fl. Mex. 198 and 199] (C!). I choose no. 199 as lectotype.

Aspidium bourgaei Fourn., Mex. Pl. 1:98. 1872. —TYPE: Mexico [Veracruz], "in valle Cordobensi," *Bourgeau 1839*] (P! isotype C).

Aspidium scabriusculum Davenp., Bot. Gaz. (Crawfordsville) 21:255. 1896. —*Dryopteris davenportii* C. Chr., Ind. Fil. 260. 1905. —TYPE: Mexico, Veracruz, above Orizaba, *Pringle 6132* (isotypes B, K, P!, S, US).

ILLUSTRATION: none found.

Rhizome erect, massive, the apex and stipe bases clothed with dense tangled scales, scales castaneous to reddish brown; fronds to 1 m or more long; blade deltoid, deeply 3-pinnate-pinnatifid at base, gradually less divided distally, lowermost pinnae largest, opposite or subopposite, ascending, ca. 45 cm long, basiscopically much produced; ultimate segments oblique, at apex rounded or acutish; costae and costules below scaly, scales ovate-lanceolate to ovate, concolorous to dark brown in axils of pinnae and pinnules, often clathrate and iridescent, flat or vaulted (not bullate); costae and costules above with *Ctenitis*-hairs 0.2–0.3 mm long; leaf tissue on both sides glabrous or below with short glandular hairs; segment margin ciliate; sori exindusiate or with a small fugacious, eglandular indusium; $n = 41$ (Oax.).

Often becoming subdominant in the understory, especially on slopes along streams in Montane Rain Forest, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; common in Northern Highlands, Central Plateau, Sierra Madre; 1350–2300 m. Tropical Mex. (Nay., Jal., Mich., Tam., Hgo., Méx., Mlos., Ver., Pue., Oax.), Guat. to Pan. CHIAPAS COLLECTIONS: *EM 2934* (MEXU, NY); *EM 2948* (MEXU, US); *EM 2970* (MEXU); *GM 135* (DS); *21764*; *22309*; *22597*; *24029*; *24985*; *31346*; *31625*; *32545*; *32746*; *33659*; *34410*; *41635*.

A variable species, some specimens lacking both indusia and leaf tissue pubescence, others possessing these features. Closely related to *C. sloanei*, which is rare in Chiapas, differing by the characters given in the key.

4b. **Ctenitis equestris** var. **erosa** Stolze, Amer. Fern J. 67:41, figs. 5, 6. 1977.

—TYPE: Guatemala, Dept. San Marcos, Cerro Tumbador, *Williams et al. 23084* (F; isotype US).

ILLUSTRATION: only the original.

Differs from var. *equestris* in the scales of upper part of stipe, rachis, and pinna axils more abundant, often imbricate and fully concealing axis, orangish, commonly broadly ovate, the margin erose and irregularly denticulate or short-ciliate, mostly firmly appressed, cells ± isodiametric; scales of costules orange, flaccid, flattened; indusia lacking.

Oak woods; rare in Central Plateau (Cerro Hueytepec); 2500 m. Southern Mex. (Oax.), Guat. CHIAPAS COLLECTION: *L&S 9938* (UC).

This well-marked variety consistently occurs at higher elevation than var. *equestris* in Oaxaca, Chiapas, and Guatemala.

5. **Ctenitis excelsa** (Desv.) Proctor, Rhodora 63:34. 1961.

—*Polypodium excelsum* Desv., Mém. Soc. Linn. Paris 6:243. 1827. —*Dryopteris excelsa* (Desv.) C. Chr., Ind. Fil. 264. 1905. —TYPE: Antilles, exact locality not indicated, collector not stated (P, photo UC!; fragment B).

ILLUSTRATION: **Fig. 30.**

Similar to *Ctenitis equestris*, differing from that species in (1) rhizome apex and stipe base with a dense mat of orangish, linear or filiform scales; (2) ultimate segments oblong, oblique, often subfalcate and acutish at tip, with segment margins eciliate; (3) leaf tissue and axes below with sparse glands or commonly eglandular; (4) indusia absent. From *C. sloanei*, differing in (1) darker costal scales; (2) eglandular leaf tissue; and (3) eciliate segment margins.

Stream banks and ravines, cafetals, in Tropical, Lower Montane, and Montane rain forests, also Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, lower elevations of Central Plateau and Sierra Madre, Pacific Coastal Plain; 200–800 (1350) m. Southern Mex. (Oax., Ver.), Bel., Guat., Hond., C.R., Pan.; L. Antill. CHIAPAS COLLECTIONS: *Fi 35397* (US); *R 860* (NY, PH); *EM 18161* (MEXU, US); *P 6714* (NY, UC, US); *21869*; *22259*; *22527*; *27454*; *31571*; *32546*; *32841*; *34105*; *40134*.

I follow Stolze (Amer. Fern J. 67:43. 1977) in recognizing this species as distinct from *C. equestris* and *C. sloanei*. In Chiapas, as in Guatemala (Stolze, in litt.), *C. excelsa* grows at lower elevations than *C. equestris*. At one locality in the Northern Highlands (elevation 1350 m), both species have been collected (*32546*, *32545*); this is the highest recorded elevation in Chiapas for *C. excelsa* and the lowest recorded elevation for *C. equestris*.

6. **Ctenitis grisebachii** (Baker) Ching, Sunyatsenia 5:250. 1940.

—*Nephrodium grisebachii* Baker *in* Hook. & Bak., Syn. Fil. 285. 1867. —*Dryopteris grisebachii* (Baker) O. Ktze., Rev. Gen. Pl. 2:812. 1891. —TYPE: Cuba, *Wright 1055* (K—3 sheets!).

Ctenitis molinae Stolze, Amer. Fern J. 67:40, figs. 1–4. 1977. —TYPE: Guatemala, Dept. Chimaltenango, Volcán Fuego, *Steyermark 52120* (US; isotype F).

ILLUSTRATION: Christensen (1920:45, pinnule).

Rhizome decumbent (fide Christensen, 1920); stipe densely scaly, scales linear-lanceolate, to ca. 1 cm long, 1 mm wide, entire, glossy, patent or reflexed; blade deltoid, 3-pinnate-pinnatifid below, gradually less divided distally, 75 (100+) cm long; pinnae opposite to subopposite, ascending, the lowest the largest, 35 (40+) cm long, ca. 13 cm broad, lower side slightly produced; ultimate segments oblique, rounded at apex; veins reaching margin; costae and costules below with scattered castaneous, concolorous, lanceolate to ovate-lanceolate, entire, flat scales to ca. 1 mm long, also with minute appressed glandular hairs; costae and costules above with dense *Ctenitis*-hairs 0.3–0.6 mm long; leaf tissue above and below glabrous; sori inframedial, with a prominent, persistent, tan, concolorous, minutely glandular indusium; $n = 82$ (Jam.).

In Montane Rain Forest; rare in SE Central Plateau (Lago Tziscao); 1300 m. Guatemala, Hond., Nic.; Cuba, Jam., Hisp. CHIAPAS COLLECTION: *32211.*

The single Chiapas collection apparently represents the only collection from Mexico. The newly described *C. molinae* from Guatemala to Nicaragua seems not to be distinguishable from *C. grisebachii.*

Christensen (1920:44) questioned the identity of *Aspidium ameristoneuron* Fée (Mém. Fam. Foug. 8:104. 1857), believing it not to be the same as *Ctenitis grisebachii* as had been previously supposed. On the basis of the original description and distribution of *Aspidium ameristoneuron* (''Cuba'' according to Fée, probably Tabasco according to Christensen), Christensen thought that it might be *Ctenitis sloanei.* However, I think it is more likely *C. salvinii,* which see for further discussion.

7. **Ctenitis hemsleyana** (Baker ex Hemsl.) Copel., Gen. Fil. 124. 1947.

—*Polypodium hemsleyanum* Baker ex Hemsl., Biol. Centr.-Amer. 3:660, pl. 108. 1885. —*Dryopteris hemsleyana* (Baker ex Hemsl.) C. Chr., Ind. Fil. 270. 1905. —TYPE: Guatemala, ''Chilasco,'' *Godman & Salvin s.n.* (K!).

ILLUSTRATION: original.

Rhizome erect, apex and stipe bases covered with numerous, dark brown, subulate, patent scales; stipe about as long as blade; blade deltoid, 20–30 cm long, 15–20 cm broad, ± tripartite, deeply bipinnate-pinnatifid at base, deeply pinnate-pinnatifid above basal pair of pinnae; pinnae subopposite below, alternate distally, lowermost largest, 10–15 cm long, their basiscopic pinnules much enlarged, 4–6 cm long, acroscopic pinnules ca. 1.5 cm long; ultimate segments oblique, subfalcate, acute at tip; costae below with tan scales, these bullate at base with an acuminate tip, mostly 1–1.5 mm long, also with scattered reddish cylindrical glands 0.1 mm long along costae and costules; costae above with dense *Ctenitis*-hairs ca. 0.3 mm long; leaf tissue on both sides glabrous; sori inframedial, exindusiate.

In Montane Rain Forest, Evergreen Cloud Forest; uncommon and scattered in Northern Highlands, Central Plateau, Sierra Madre; 900–2700 m. Southern Mex. (Ver., Pue., Oax.), Guat., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *22660*; *23193*; *31329*; *31504*; *31998*; *32188*; *32625*; *34700*; *35186*.

Christensen (1920) referred to the costal scales as ''scarcely bullate,'' but Chiapas specimens and most Mexican specimens that I have seen have decidedly bullate costal scales. Probably most closely related to *C. bullata*.

8. **Ctenitis interjecta** (C. Chr.) Ching, Sunyatsenia 5:250. 1940.

—*Dryopteris interjecta* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:43. 1920. —TYPE: Guatemala, Dept. Alta Verapaz, Cubilquitz, *v. Tuerckheim s.n.* [ed. Donn.-Smith 8049] (US; isotypes B, P, US!).

ILLUSTRATION: none found.

Of Chiapas species, most similar to *C. melanosticta*, agreeing with that species in blade shape (ovate) and basal pinnae ± equilateral, not strongly basiscopically produced. Differing from *C. melanosticta* in stipe base scales reddish tan, very narrow, hairlike, dense and often intertangled, flaccid (similar to those of *C. equestris* and *C. sloanei*); scales of costae and costules below subbullate or hairlike and flaccid, tan; leaf tissue and axes below eglandular or nearly so; indusia minute and fugacious, tan, concolorous, or seemingly absent.

In Tropical Rain Forest; rare in Eastern Highlands near Guatemala border; 300 m. Southern Mex. (Chis. only), Bel., Guat., Hond. CHIAPAS COLLECTION: *34078.*

As Christensen (1920) stated, this species seems to bridge the gap between *C. melanosticta* and *C. equestris,* members of two different subgroups in Christensen's classification.

9. **Ctenitis lanceolata** (Baker) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:229. 1975.

—*Nephrodium lanceolatum* Baker, Syn. Fil., ed. 2, 498. 1874. —*Dryopteris lanceolata* (Baker) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —TYPE: Guatemala, Alta Verapaz, Cobán, *Salvin & Godman s.n.* (K!).

Nephrodium tricholepis Baker *in* Hemsley, Biol. Centr.-Amer. 3:651. 1885. —*Dryopteris tricholepis* (Baker) C. Chr., Ind. Fil. 298. 1905. —*Dryopteris lanceolata* var. *tricholepis* (Baker) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:107. 1913. —LECTOTYPE (chosen by Christensen, 1913:107): Guatemala, ''Mountains of Verapaz,'' *Salvin s.n.* (K!).

ILLUSTRATION: Christensen (1913:106, fig. 10, c, d).

Rhizome suberect; stipes fasciculate, ca. 1 mm diam., with spreading scales; blade bipinnate to bipinnate-pinnatifid, 15 cm long, 4 cm broad (ours); pinnae to ca. 15 pairs, short-stalked, lowermost somewhat shortened; pinnules oblong, oblique, often deeply obtusely lobed at base, lobes of anterior side larger, inferior side subentire to shallowly lobed, decurrent onto costa; veins 2–4 pairs per pinnule, not reaching margin; costae below with numerous tan to blackish scales with a bullate base and hairlike tip, above with dense *Ctenitis*-hairs; leaf tissue thinly herbaceous, glabrous on both sides; sori with a large, persistent, tan, glabrous indusium.

In Montane Rain Forest; rare in SE Central Plateau (Lago Tziscao); 1250 m. Known only from Chis. and Guat. (Alta Verapaz). CHIAPAS COLLECTION: *38989a.*

10. **Ctenitis melanosticta** (Kunze) Copel., Gen. Fil. 124. 1947.

—*Aspidium melanostictum* Kunze, Linnaea 13:148. 1839. —*Dryopteris melanosticta* (Kunze) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —TYPE: Mexico [Veracruz], Chiconquiaco, *Schiede* [*765*] (isotype B).

ILLUSTRATION: Hooker, Sp. Fil. 4:34, pl. 233B. 1862.

Rhizome erect, stipe at base densely clothed with dark brown hairlike patent scales, after a few cm becoming moderately to sparsely scaly; blade bipinnate-pinnatifid to shallowly tripinnate-pinnatifid, 60–80 cm long; pinnae (largest) 30 cm long, 10–14 (17) cm broad, ± equilateral, basal 2–3 pairs of pinnules abbreviated; ultimate segments very oblique, subfalcate, serrate to entire, mostly acutish at tip; veins nearly reaching margin, not ending in hydathodes above; costae and costules below with tan bullate to subbullate scales, above with *Ctenitis*-hairs 0.2–0.3 mm long; leaf tissue chartaceous, both sides glabrous, or inconspicuously appressed-glandular below; sori medial, with large rotund-reniform indusia ca. 1.0 mm diam.; indusia persistent, glandulose-ciliate, bicolorous with a tan margin and dark brown to blackish center; $n = 41$ (Chis.).

In Tropical and Lower Montane rain forests; common in Northern and Eastern highlands; 200–1250 m. Eastern and s Mex. (Tam., S.L.P., Ver., Oax.), Bel., Guat. to C.R. Chiapas Collections: *S&S 5494* (CAS, US); *GM 18* (DS, US), probably erroneously labelled as San Cristóbal; *R 1110* (cited by Rovirosa, but specimen not seen); *Sohns 1718* (US); *21663*; *22146*; *22480*; *22488*; *24211*; *24223*; *24810*; *26608*; *32895*; *33122*; *33859*; *34458*; *34954*; *34999*; *38040*.

11. **Ctenitis nigrovenia** (Christ) Copel., Gen. Fil. 124. 1947.

—*Nephrodium nigrovenium* Christ *in* Donn.-Smith., Bot. Gaz. (Crawfordsville) 20:545. 1895. —*Dryopteris nigrovenia* (Christ) C. Chr., Ind. Fil. 279. 1905. —Type: Honduras, Dept. Santa Barbara, San Pedro Sula, *Thieme s.n.* [ed. Donn.-Smith 5646] (P! isotype US).

Illustration: Christensen (1913:104).

Rhizome short-creeping, fronds not fasciculate; stipe to 50 cm long, 3 mm broad, with a few ovate-lanceolate scales at base; blade pinnate-pinnatifid, to 50 cm long, 25 cm broad; pinnae ca. 12 pairs, to 13 cm long, 3 cm broad, incised nearly to costa; segments slightly oblique, 4–5 mm broad, not falcate, entire to usually slightly serrate especially towards the minutely mucronate apex; veins 6–9 pairs, simple, sometimes dark-colored; costae below with scattered subbullate scales, tip attenuate, hairlike, blackish, base expanded, clathrate, above with *Ctenitis*-hairs; leaf tissue herbaceous, glabrous above, with yellowish cylindrical glands ca. 1 mm long below; sori medial, exindusiate (most Chiapas specimens) or with a small fugacious indusium.

Limestone ridges and streambanks in Tropical, Lower Montane, and Montane rain forests; uncommon in Eastern and Northern highlands (but not Jitotol Ridge); 200–800 m. Southern Mex. (S.L.P., Ver., Oax.), Guat., Hond., further south? Chiapas Collections: *C&D 165* (US); *22250*; *27459*; *33154*; *33369*; *33888*; *38167*.

I exclude from this species the closely related *Dryopteris tonduzii* (Christ) C. Chr., type from Costa Rica ("Forêts de Tuis," *Tonduz 11333*, P!, fragment BM!), which differs from our species in being indusiate, also in having tan, subbullate, nonclathrate scales on costae below, more densely glandular leaf tissue below, narrower pinnae with entire segments, and narrower sinuses. Material from Costa Rica, Panama, Trinidad, and South America (Col., Ven., Peru) appears to be mostly (entirely?) indusiate. Another indusiate species of this group is *Ctenitis thelypteroides*, which see. Monographic treatment of this complex is needed.

Breedlove 42642, from 2000 m in the southern Sierra Madre, Evergreen Cloud Forest, is perhaps this species, but the lamina and costae below are eglandular, the costal scales are not so abruptly tapered into a long, hairlike tip, and the pinnae are more deeply incised. In its scales and glabrous lamina, it is more like *C. baulensis*.

12. **Ctenitis pansamalensis** (C. Chr.) Ching, Sunyatsenia 5:250. 1940.

—*Dryopteris pansamalensis* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:72. 1920. —Type: Guatemala, Alta Verapaz, Pansamalá, *v. Tuerckheim s.n.* (ed. Donn.-Smith 1055) (US; isotype UC!).

Illustration: none found.

Differing from *Ctenitis subincisa*, the most similar Chiapas species, by scales of stipe and rachis entire, ovate-lanceolate, more or less appressed; costae, costules, and veins on both sides with numerous, long, flexuous, pluricellular, whitish hairs 1–2 mm long, also with some shorter hairs on leaf tissue below; short-stipitate glands on leaf tissue above; basal basiscopic segment of more distal pinnules adnate their width to the costa, their midvein arising from costa.

In Lower Montane Rain Forest; rare in Eastern Highlands near Guatemala border; 800 m. Southern Mex. (Chis. only), Guat. Chiapas Collection: *42014*.

Apparently a rare species. The sole Chiapas collection differs from the Guatemalan type by its smaller blades, the largest pinnae being less than 20 cm long; otherwise it is very similar.

13. **Ctenitis pulverulenta** (Poir.) Copel., Gen. Fil. 124. 1947.

—*Polypodium pulverulentum* Poir. *in* Lam., Encycl. Méth. 5:555. 1804. —*Dryopteris pulverulenta* (Poir.) C. Chr. *in* Urban, Symb. Ant. 9:305. 1925. —Type: based on Plumier, Tract. Fil. Amer. 27, pl. 34, 1705, illustrating a plant from Hispaniola.

Polypodium karstenianum Klotzsch, Linnaea 20:390. 1847. —*Dryopteris karsteniana* (Klotzsch) Hieron., Hedwigia 46:348. 1907. —*Ctenitis karsteniana* (Klotzsch) Vareschi, Fl. Venez. 1(1):405. 1969. —Type: Venezuela, *Karsten II.3* (B).

Illustration: Karsten, Fl. Columb. 2:pl. 150. 1865.

Rhizome erect (caudex to 2 m tall, vide Karsten, loc. cit.); stipes more than 1 m long, 1 cm diam., clothed at base with long brownish scales; blade quadripinnate at base, to 2 m long; pinnae subopposite, lowermost largest, to 1 m long, perpendicular to rachis, basiscopically produced; ultimate segments rounded at apex; costae and costules below with dark brown, shiny, toothed scales, also softly pilose with long articulated whitish flexible hairs, sometimes glabrescent; costae and costules above densely strigose by long, falcate, antrorse hairs; leaf tissue on both sides glabrous; sori medial, exindusiate; $n = 41$ (Jam.).

In Montane Rain Forest, Evergreen Cloud Forest; uncommon in s Sierra Madre, Northern Highlands, Central Plateau; 1200–2300 m. Southern Mex. (Chis. only), Guat., C.R.; S.A. (Col., Ven., Ecu., nw Arg.?); Jam., Hisp. Chiapas Collections: *22622*; *31677*; *32364*; *33687*; *34621*.

The largest Chiapas species of *Ctenitis* (with fronds sometimes exceeding 3 m); perhaps the largest species in the genus. Christensen (1920) described var. *heydei* from Guatemala, indicating that it was glabrous; most Chiapas material is sparsely hairy to glabrescent on the axes below, but a few specimens (e.g., *33687* and *34621*) show the long, dense, septate hairs of the more typical form found in Jamaica and Costa Rica.

14. **Ctenitis refulgens** (Klotzsch ex Mett.) Vareschi, Fl. Venez. 1(1):404. 1969.

—*Phegopteris refulgens* Klotzsch ex Mett., Ann. Sci. Nat. Bot. (5)2:240. 1864. —*Polypodium refulgens* (Klotzsch ex Mett.) Baker, Syn. Fil. 307. 1867. —*Dryopteris refulgens* (Klotzsch) C. Chr., Ind. Fil. 288. 1905. —Lectotype (chosen by Christensen, 1913:89): British Guiana [=Guyana], *Schomburgk 1183* (B).

Illustrations: Christensen (1913:90, fig. 5a); Fée, Crypt. Vasc. Brés. 1:pl. 32, fig. 1. 1869 [as *Phegopteris tricholepis* Fée].

Similar to *C. submarginalis,* but the pinnae broader (2.5–4 cm) and longer (15–20 cm), incised only ⅓–½ their width; stipe densely scaly the whole length; rachis and costae beneath with rather dense reddish, narrow, stiff, patent, entire scales; costae above with some scales like those below; largest segments 6–7 mm broad, bluntly rounded to subacute; lowermost 2–5 pairs of veins from adjacent segments running to sinus, lowermost much ascending, upper ones not reaching margin; sori medial or slightly inframedial, exindusiate.

In Tropical Rain Forest; rare in Eastern Highlands near Guatemala border; 350 m. Otherwise reported from Pan.; S.A. (Col., Br. Gui., N Braz., Peru). CHIAPAS COLLECTION: *33376.*

The Chiapas specimen agrees well with Christensen's (1913) description and illustration except that the margins and veins beneath are glabrous rather than finely pubescent. This species, although related to *C. submarginalis,* is certainly distinct insofar as our specimen is concerned. The range extension to southern Mexico is remarkable.

15. **Ctenitis salvinii** (Baker) Stolze, Amer. Fern J. 67:43. 1977.

—*Nephrodium salvinii* Baker *in* Hook. & Bak., Syn. Fil. 274. 1867. —*Dryopteris salvinii* (Baker) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —TYPE: Guatemala, "Choctum," *Salvin & Godman s.n.* (K!).

Aspidium lindenii Kuhn, Linnaea 36:116. 1869. —*Dryopteris lindenii* (Kuhn) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —*Ctenitis lindenii* (Kuhn) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:229. 1975. —TYPE: Mexico, Tabasco, Teapa, *Linden 1489* (holotype B, photo BM!; isotypes K! P, W!; fragment BM!).

ILLUSTRATION: Christensen (1913:104).

Rhizome obliquely erect; stipes fasciculate, 15–25 cm long, 1.5–2.5 mm diam., with spreading, castaneous, subulate scales at base; blade deeply pinnate-pinnatifid to barely bipinnate, 15–40 (50) cm long, 6–12 (15) cm broad; pinnae 15–20 pairs, stalked 1–3 mm, lowermost ones somewhat shortened, middle ones 3–5 (7) cm long, 1–2 cm broad, broadest at the middle, deeply incised; segments oblique, obtuse, distinctly serrate, the largest serrately incised halfway to costule; veins 3–5 pairs, not reaching margin; costae below with numerous tan, bullate scales, above with dense *Ctenitis*-hairs; leaf tissue thinly herbaceous, glabrous on both sides (ours) or sparsely glandular below; sori medial with a large, persistent, glandular indusium.

Calcicolous in Tropical, Lower Montane, and Montane rain forests; locally common in Northern Highlands (but not Jitotol Ridge), rare in Eastern Highlands; 300–1000 m. Southern Mex. (Tab.), Guat. CHIAPAS COLLECTIONS: *MC 2110* (US); *21005*; *21665*; *22485*; *22489*; *24217*; *26535*; *28864*; *31490*; *34543*; *35000*; *35345*; *39890*; *41997*.

The type of *Ctenitis salvinii* differs from all Chiapas collections in bearing scattered glands on the leaf tissue below and in having a more densely glandular indusium; also it is somewhat larger than most Chiapas material.

Aspidium ameristoneuron Fée (Mém. Fam. Foug. 8:104. 1857), said by Fée to be from "Cuba" but by Christensen (1920:44), citing a Mettenius annotation in B) to be from "Tabasco. 1489. Jurgensen," is possibly an earlier name for *Ctenitis salvinii.* Most likely the Berlin specimen annotated by Mettenius is *Linden 1489* (Linden did collect in Tabasco; as far as I know, Jurgensen did not). *Linden 1489* is also the type of *Ctenitis lindenii.* Fée's description of *Aspidium ameristoneuron* seems to fit plants considered here, but until the identity of the type is settled, I prefer to use the epithet *salvinii.*

16. **Ctenitis sloanei** (Spreng.) Morton, Amer. Fern J. 59:66. 1969.

—*Polypodium sloanei* Poeppig ex Spreng., Linn. Syst. Veg., ed. 16, 4(1):59. 1827. —TYPE: Cuba, near Cahoba, *Poeppig s.n.* (isotypes B, L, P).

For additional synonymy, see Christensen (1920:49).

ILLUSTRATIONS: Small, Ferns SE States 292. 1938 (as *Dryopteris ampla*); Wherry, Southern Fern Guide 140. 1964 (as *Ctenitis ampla*); Proctor, Fl. L. Antill. 2:243. 1977.

Rhizome erect, the caudex 4–5 cm diam., apex and stipe bases clothed with dense, tangled, woolly, hairlike scales, the scales reddish tan, ca. 4 cm long, 1 mm broad or less, entire; stipe to 70 cm long, 8 mm diam.; blade deltoid, quadripinnate at base, bipinnate-pinnatifid upwards; pinnae ca. 12 pairs, lowermost largest, subopposite, patent, to 50 cm long, 23 cm broad, basiscopically produced; ultimate segments oblique, subfalcate, obtuse or subacute at tip; veins reaching margin, simple or furcate; costae and costules below with tan, ovate-lanceolate, flat, appressed, antrorse scales, these subcordate at base, most numerous in axils of pinnae and pinnules, costae and costules above with *Ctenitis*-hairs; leaf tissue herbaceous, yellowish green, below (and sometimes above) with yellowish cylindrical glands ca. 0.1 mm long; sori exindusiate or with a very small, fugacious, tan, glandular indusium; $n = 41$ (Jam., Gal.).

In Tropical Rain Forest; rare in Eastern Highlands, 350 m. Southern Mex. (Chis. only), C.R., Pan.; S.A. (Col., Ven., Ecu.); Fla., Antill., Trin. CHIAPAS COLLECTION: *33125.*

Closely related to *C. equestris* but differing by the characters given in the key. The name *ampla* has often been applied to this species, but Morton has shown that *ampla* applies to a South American species heretofore known as *C. nemophila* (Kunze) Ching.

17. **Ctenitis subincisa** (Willd.) Ching, Sunyatsenia 5:250. 1940.

—*Polypodium subincisum* Willd., L. Sp. Pl., ed. 4, 5:202. 1810. —*Dryopteris subincisa* (Willd.) Urban, Symb. Antill. 4:19. 1903. —TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19701).

Polypodium galeottii Martens, Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):43, pl. 7, fig. 3. 1842. —TYPE: Mexico [Veracruz], "Mirador" (specimen), *Galeotti 6321* (BR! isotype BR!).

Phegopteris stenolepis Fée, Mém. Fam. Foug. 8:89. 1857 (as *P. stenolepsis*). —TYPE: Mexico, Veracruz, "près de Huatusco" *Schaffner 239* (P? isotype K!).

For additional synonymy, see Christensen (1920:65).

ILLUSTRATION: Christensen (1920:66).

Rhizome erect, stipe 50 cm long or more, to 1 (1.5) cm diam., brownish, base densely scaly, scales 1–3 cm long, twisted, castaneous, glossy, linear-lanceolate, sharply toothed; blade deltoid, ca. 1 (2) m long, tripinnate-pinnatifid below; pinnae subopposite, ascending, the basal the largest, to 1 m long, basiscopically produced; ultimate segments oblique, truncate or round at tip; veins simple or furcate, terminating well within margin, tips forming an oblong hydathode on upper surface; costae and costules below with scattered castaneous toothed scales, lumina not transparent, above strigose by falcate, antrorse, pluricellular hairs to 1 mm long; leaf tissue above glabrous, below with unicellular, erect, whitish hairs 0.1–0.2 mm long, or glabrous, eglandular; sori medial, exindusiate; *n* = ca. 82 (Jam.).

In Lower Montane and Montane rain forests; common in Northern and Eastern highlands, se Central Plateau, s Sierra Madre; 350–2000 m. Southern Mex. (Gro., Oax., Ver.), Guat., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol.); Antill. Chiapas Collections: *C&D 234* (US); *GM 116a* (DS); *P 7230* (NY, UC, US); *P 7255* (UC, US); *P 11086* (UC); *R 817* (NY, PH); *G 365* (K, NY, PH, YU); *21602*; *22633*; *31492*; *31884*; *33078*; *33102*; *35134*; *38082*; *38931*.

18. **Ctenitis submarginalis** (Langsd. & Fisch.) Ching, Sunyatsenia 5:250. 1940.

—*Polypodium submarginale* Langsd. & Fisch., Icon. Fil. 12, tab. 13. 1810. —*Dryopteris submarginalis* (Langsd. & Fisch.) C. Chr., Ind. Fil. 296. 1905. —Type: Brazil, "insula Catharinae."

Aspidium microchlaena Fée, Mém. Fam. Foug. 8:102. 1857. —Type: Mexico, Veracruz, Orizaba, *Schaffner 459* (presumably P, not found; isotype K!).

Aspidium obtusilobum Fée, Mém. Fam. Foug. 8:105. 1857, not Willd., 1810. —*Dryopteris huatuscensis* C. Chr., Ind. Fil. 271. 1905. —Type: Mexico [Veracruz], Huatusco, *Schaffner 105* (not found at P); *Schaffner s.n.* (P!), without locality data, is probably authentic material.

Aspidium microcarpon Fée, Mém. Fam. Foug. 8:105. 1857 (not Blume, 1828). —Type: Mexico, près de Cordoba, *Schaffner 214* (presumably P, not found).

Aspidium karstenii A. Braun, Ind. sem. hort. Berol. app. 1857:3. —*Dryopteris karstenii* (A. Braun) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:98, fig. 6. 1913. —Type: cultivated in Hort. Berol. and raised from spores of plants collected in Venezuela by *Karsten* (B; photo and fragments BM!).

For additional synonymy see Christensen (1913:95–98).

Illustration: Small, Ferns SE States 259. 1938.

Rhizome erect, apex and stipe bases with a dense mat of castaneous scales, these 1–2 cm long, 1 mm broad; stipe to 30 (45) cm long, 5 mm diam.; blade pinnate-pinnatifid, to 70 cm long; pinnae (largest) 8–12 (16) cm long, 2.5 cm broad, stalked to 5 mm; ultimate segments 4–6.5 mm broad, oblique, not or only slightly falcate, entire or faintly toothed near the obtuse apex with a very narrow sinus between segments; veins 6–8 pairs, simple, reaching margin; costae below with scattered tan lanceolate-attenuate scales, glandular, above with *Ctenitis*-hairs; leaf tissue glabrous on both sides or with yellowish, appressed, cylindrical glands; sori medial to supramedial, indusiate, the indusium sometimes very small, fugacious; *n* = 41 (Fla.).

In Lower Montane and Montane rain forests; uncommon in Northern and Eastern highlands, n Sierra Madre; 600–1600 m. Eastern and s Mex. (Hgo., Ver., Oax.), Guat., Nic., C.R.; S.A. (Ven. and Col. to Peru, Braz., Urug., Parag., n Arg.); Hisp., Fla. Chiapas Collections: *27456*; *31352*; *32934*; *33083*; *38041*.

The description above applies to Mexican material, which may differ specifically from the Brazilian type. The Langsdorf and Fischer plate is not typical of Chiapas material in that the segments are truncate-acute, while Chiapas specimens have obtuse or rounded segments; furthermore, nearly all Brazilian material that I have seen is exindusiate, while four of five Chiapas specimens have rather large, fimbriate-margined indusia. Specimens from Haiti, Nicaragua, Costa Rica, and Andean South America appear also to be indusiate, although the indusia may be quite small. All that prevents me from adopting another name is finding the oldest one that applies; the four synonyms cited (all published the same year) almost certainly do apply to Chiapas material, but there may be others, e.g., *Polypodium caripense* Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:202, 1810 (type from Venezuela, Caripe, herb. Willd. 19700-1 and 2), which Christensen recognized as a form of *Ctenitis submarginalis*.

19. **Ctenitis thelypteroides** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:215, fig. 2, A–D. 1975.

—Type: Mexico, Chiapas, Munic. Las Margaritas, western side of Laguna Miramar east of San Quintín, *Breedlove 33280* (DS!).

Illustration: only the original.

Rhizome short-creeping to obliquely erect, mostly obscured by stipe bases, to 4 mm diam.; stipe to 28 cm long, 2 mm diam., at base with spreading, lanceolate, castaneous scales to 5 mm long, rachis with similar, but smaller, scales; blade pinnate-pinnatifid, to ca. 30 cm long, 16 cm broad; pinnae up to 15 pairs, petiolulate to 2 mm, up to 9 cm long, 2 cm broad, deeply incised to within 1 mm of costae; segments oblique, ca. 3 mm broad, at apex acute or obtuse, minutely toothed, basal segments somewhat reduced and more crowded than distal segments; veins up to 8 pairs, lowermost reaching margin 1–2.5 mm above sinus; costae below glandular and with scattered, linear-lanceolate, castaneous, non-bullate, entire scales to 1.5 mm long, above with dense *Ctenitis*-hairs to 0.5 mm long; leaf tissue below glabrous or with inconspicuous, scattered, appressed, tubular, yellow glands; sori up to 6 per segment, mostly confined to tips of segments, 0.5–1.0 mm diam.; indusia ca. 0.3 mm diam., tan, persistent.

In Tropical Rain Forest; uncommon in Eastern Highlands (near Laguna Miramar); 200 m. Known only from Chis. and Guat. (Dept. Petén). Chiapas Collections: *S 1696* (US); *33280* (type).

I maintain this as distinct from *C. nigrovenia* but with less confidence than before. It is possibly only a less developed variation of *C. nigrovenia* but seems to differ by the smaller indusiate sori localized at the tips of segments, the segments not so toothed or mucronate at the tip, and the more crowded pinna segments. Further study is needed.

20. **Ctenitis ursina** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:216, fig. 3, C–E. 1975.

—Type: Mexico, Chiapas, Munic. La Trinitaria, e of Lago Tziscao, Monte Bello National Park, *Breedlove* (*with Smith*) *32274* (DS—2 sheets).

Illustration: only the original.

Rhizome unknown (probably suberect, massive); stipe 50 or more cm long, to ca. 1 cm diam., very densely covered with spreading, lanceolate, entire or sparingly denticulate, shiny-brown scales to ca. 1 cm long, 1 mm wide; rachis, costae, and costules like the stipe but progressively smaller and with less dense and lighter-colored scales, these bullate on costae and costules; blade tripinnate-pinnatifid, to 75 cm long, 70 cm wide, deltoid; pinnae ca. 10–12 pairs, to ca. 37 cm long, 13 cm broad, equilateral; pinnules up to ca. 20 pairs per pinna, adnate and decurrent towards apex of pinnae, slightly reduced at base of pinnae, to 6 cm long, 1.5 cm wide; segments deeply serrate to entire; veins ending before the margin; axes above with dense *Ctenitis*-hairs ca. 0.5 mm long; leaf tissue on both sides glabrous; sori ca. 1 mm diam.; indusia persistent, rotund-reniform, tan with a slightly darker center, erose to glandulose-ciliate on margin.

In Montane Rain Forest; uncommon in Eastern Highlands (near Lago Tziscao); 1300 m. Endemic to Chis., known only from the type and *35261*.

Closely related to *C. melanosticta*, differing by the densely scaly stipes and by the indusia not so distinctly bicolorous.

Species to Be Looked for in Chiapas

Ctenitis strigulosa (Davenport) Copel. —Ver. (type), Guat.; calcicolous. See comments under *C. bullata*, the closest relative.

One Chiapas collection, *Breedlove 33084* (DS) from Laguna Ocotal Grande, is so very different from any described species that I suspect that it may be a hybrid. The specimen is clearly in the *C. submarginalis* group, with reddish, flat, costal scales, but differs from *C. submarginalis* in being bipinnate-pinnatifid, the pinnules adnate, decurrent and very long, up to 2.5 cm. The sporangia are too young to determine whether the spores are abortive or not. If it is indeed a hybrid, it would probably be between *C. submarginalis* and some decompound species (*C. equestris*?).

26. CULCITA

Culcita Presl, Tent. Pterid. 135, pl. 5, fig. 5. 1836. —Type: *Culcita macrocarpa* Presl [≡*Dicksonia culcita* L'Heritier].

Plants terrestrial; rhizome prostrate and ascending, not arborescent, hairy at apex; stipe bases hairy; fronds polystichous, decompound (quadripinnate), monomorphic; veins free; sori marginal, terminal on veins; indusia of 2 concave flaps (bivalvate), outer valve (adaxial) greenish, formed from tissue of the blade, the inner (abaxial) a special outgrowth, whitish to tan; sporangia maturing basipetally; annulus slightly oblique; spores tetrahedral; $x = 58, 66$.

A sole Neotropical species, one species in the Atlantic islands (Madeira), and seven similar species from Polynesia, Australia, Malesia (Copeland, 1947). The New World species occurs primarily in Evergreen Cloud Forests at high elevations. *Culcita* is possibly most closely related to *Dicksonia* or to certain other dicksonioid genera as *Thyrsopteris* and *Cibotium*.

Reference: Maxon, W. R. 1922. The genus *Culcita*. J. Wash. Acad. Sci. 12:454–460.

1. **Culcita coniifolia** (Hook.) Maxon, Annual Rep. Board Regents Smithsonian Inst. 1911:488, pl. 13C. 1912.

—*Dicksonia coniifolia* Hook., Sp. Fil. 1:70, pl. 24A. 1844. —Type: Venezuela, "Caraccas," *Linden 538* (K; isotype BR, photo UC!).

Illustrations: see those cited above; also Stolze, Fieldiana, Bot. 39:98. 1976.

Rhizome apex and stipe base hairs dense, stout, castaneous to bronze, shining, mostly 1–3 cm long, septate; fronds large, ca. 1–3 m long; blade broadly deltoid, 4–5-pinnate-pinnatifid at base; ultimate pinnules oblique; axes below hairy (especially in axils) to glabrescent; valves of indusia about twice as broad as long; $n = 66$ (C.R.).

Edges of Evergreen Cloud Forest; uncommon on highest peaks of Central Plateau, s Sierra Madre; 2700–2800 m. Southern Mex. (Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. and Ven. to Ecu.; s Braz.); Jam., Cuba, Hisp. Chiapas Collections: *GM 91* (DS); *GM 95* (DS); *JTM 1252* (US); *EM 5280* (US); *6717*; *12922*; *22002*; *22007*; *22061*; *32054*; *40833*.

27. CYATHEA

Cyathea J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:416. 1793. —Type: *Cyathea arborea* (L.) J. E. Smith [≡*Polypodium arboreum* L.].

Hemitelia R. Br., Prodr. Fl. Nov. Holl. 158. 1810. —Type: *Cyathea multiflora* J. E. Smith.

Arborescent; stipe smooth to tuberculate, or with corticinate spines, sometimes hairy; stipe scales (especially on abaxial side) ± appressed, structurally marginate, with a narrow to broad margin of cells different in orientation, size, and usually in shape and color from those of central portion, lacking dark, marginal or apical setae; minute indument of stipe (scurf), when present, of squamulae and (or) rarely of patent trichomidia; costae and costules pubescent above; veins free (sometimes areolate in two species), often forked, basal veins of ultimate segments reaching margin above sinus; indusia present, scalelike to sphaeropteroid (globose); spores tetrahedral, usually 64 per sporangium; spore exine lacking apertures or with variously distributed small pits or pores; $x = 69$.

Forty Neotropical species, from southern Mexico to Bolivia, southern Brazil, northeastern Argentina, Paraguay, and Antilles; primarily of cloud forests and montane rain forests. Most species occur in Andean regions, from Colombia and Venezuela to Peru; only three species are known in the area from Nicaragua to Mexico and two of these have been found in Chiapas.

References: Tryon, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53; 1976. A revision of the genus *Cyathea*. Contr. Gray Herb. 206:19–98.

Stipe base scales discordantly bicolorous with the whitish color of differentiated margins rather sharply delimited from dark brown central portion; stipe base scurf whitish; rachis spinulose to glabrous; costular scales brown or with whitish patches along margin, shining, mostly flattish; pinnules short- to long-stalked . . . . 1. *C. divergens* var. *tuerckheimii*

Stipe base scales castaneous, concolorous, or weakly bicolorous with tan margins (not sharply delimited); stipe base scurf brownish or absent; rachis glabrous; costular scales and scales along costa of segments tan, dull, usually strongly bullate; pinnules sessile to short-stalked . . . . 2. *C. fulva*

1. **Cyathea divergens** Kunze var. **tuerckheimii** (Maxon) Tryon, Contr. Gray Herb. 206:56. 1976.

—*Cyathea tuerckheimii* Maxon, Contr. U.S. Natl. Herb. 13:4. 1909. —Type: Guatemala, Alta Verapaz, near Cobán, *Türckheim II 1645* (holotype US! isotypes F, GH, MO, NY, P—2 sheets! UC!).

Illustrations: Tryon (1976:58, figs. 88–90); Stolze, Fieldiana, Bot. 39:110. 1976.

Trunk 2–12 m tall; fronds 2–4 m long; stipe to 2.5 cm diam., with narrow spines 1–3 mm long and linear-lanceolate scales to 2 cm long, these usually discordantly bicolorous, body dark brown, shining, margins whitish to tan, narrow; short (less than 2 mm), dense, whitish scurf also present on stipe base, this sometimes evanescent; blade bipinnate-pinnatifid to tripinnate-pinnatifid in larger specimens; rachis finely spinulose to glabrous; pinnae to 70 cm long, stalked 6–30 mm; pinnules sessile to often stalked 1–6 mm; ultimate segments 10–20 mm long, 3–5 mm broad, often falcate, basal ones frequently separate, margins crenate-serrate; scales on costules below flattish, occasionally subbullate, glossy brown or with whitish marginal patches, a few similar scales present on costae of segments; costules below without hairs, sori subcostular; indusia sphaeropteroid, glossy yellowish brown.

Arborescent, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; widely scattered in Northern and Eastern highlands, se Central Plateau, Sierra Madre; 800–1700 (2200) m. Southern Mex. (Ver., Oax.), Guat. Chiapas Collections: *P 12094* (UC); *P 12084* (US); *Dr 1688* (MEXU); *24880*; *25384*; *29566*; *31286*; *31287*; *31483*; *31672*; *31934*; *32137*; *32529*; *32735*; *33020*; *35209*.

Var. *divergens* occurs from Costa Rica to Peru and east to Guyana. It differs by its longer-stalked pinnae and pinnules, more triangular pinnules, and often broader ultimate segments.

2. **Cyathea fulva** (Mart. & Gal.) Fée, Mém. Fam. Foug. 9:34. 1857.

—*Alsophila fulva* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):78, pl. 23. 1842. —Type: Mexico, Oaxaca, Talea, *Galeotti 6346* (holotype BR!; isotypes BR! K!—in part, P!—photo GH).

Cyathea delicatula Maxon, Contr. U.S. Natl. Herb. 13:4. 1909. —Type: Guatemala, Alta Verapaz, between Tactic and Cobán, *Türckheim II 1629* (US! isotype GH).

For additional synonyms, see Tryon, 1976.

Illustrations: **Fig. 27**; Tryon (1976:71, figs. 109–113); Karsten, Fl. Columb. 2:pl. 178. 1866 [as *C. aurea* Klotzsch].

Trunk 3–12 m tall; fronds 3–5 m long, with stout spines 2–5 mm long and lanceolate scales 2–5 cm long, these concolorous or weakly bicolorous, margin tan, not sharply delimited, body of scale castaneous, shining; scurf at stipe base brownish or absent; blade bipinnate-pinnatifid; rachis ± glabrous, without spinules; pinnae to 65 cm long, stalked 2–30 mm; pinnules usually sessile, occasionally short-stalked 1–3 mm; ultimate segments mostly (4) 8–14 mm long, (2) 3–5 mm broad, straight to subfalcate, basal ones usually confluent, margins entire to crenate-serrate; scales of costules below usually bullate or subbullate, ovate, tan, concolorous; numerous tan, decidedly bullate scales present on costae of segments; costules below glabrous (ours) to hairy; sori subcostular; indusia sphaeropteroid, dull or somewhat glossy.

Tree fern in Montane Rain Forest, Evergreen Cloud Forest, common in Northern Highlands (Jitotol Ridge), Central Plateau, cen. and s Sierra Madre; (1200) 1700–2900 m. Southern Mex. (Hgo., Pue., Ver., Gro., Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col., Ven.). Chiapas Collections: *GM 24* (DS); *GM 79* (DS, US); *GM 98* (DS, US); *T 892* (DS); *T 1986* (DS, US); *T&L 41432* (DS); *15196*; *15385*; *21480*; *21517*; *21991*; *23192*; *23223*; *25010*; *31817*; *32400*; *32638*; *33568*; *34393*; *34608*; *34677*.

In Chiapas, *C. fulva* occurs generally at higher elevations than *C. divergens*; 20 of 21 Chiapas collections of *C. fulva* have been made above 1700 m, while 12 of 16 collections of *C. divergens* have been made below 1600 m. This is at variance with Tryon's (1976) statement that "it [*C. fulva*] often grows at lower elevations in Central America than other species with a sphaeropteroid indusium." The two species (*C. divergens* and *C. fulva*) are closely related and difficulty may be encountered in identifying a few specimens, especially those that are without stipe base. Tryon (1976) cited a putative hybrid from Veracruz.

Münch 74 (DS) is unusual in the pinnules being extremely broad and deeply incised, nearly or quite to the costule; the basal segments of the basal pinnules are completely free.

Cyathea jurgensenii Fourn. (Mex. Pl. 1:135. 1872), type from Mexico, Oaxaca, Sierra San Pedro Nolasco, *Jurgensen 874* (P!), is either *C. fulva* or *C. divergens* var. *tuerckheimii*, according to Tryon (1976). Tryon (1976) also stated that *Cyathea hexagona* Fée & Schaffner ex Fée (Mém. Fam. Foug. 8:111. 1857), type from Veracruz, près Huatusco, *Schaffner 237* (isotype K!), is either *C. fulva* or *C. divergens* var. *tuerckheimii*. My notes, taken at Kew, indicate that this isotype is probably a specimen of *C. fulva*.

Species to Be Looked for in Chiapas

Cyathea multiflora J. E. Smith —Bel. and Guat. to Pan., S.A. (Col. to Bol., n Braz.); differs from the two known Chiapas species in its hemitelioid indusium. To be expected in the Eastern Highlands of Chiapas.

28. CYCLOPELTIS

Cyclopeltis J. Smith, Bot. Mag. 72:Comp. 36. 1846. —Type: *Cyclopeltis semicordata* (Swartz) J. Smith [≡*Polypodium semicordatum* Swartz].

Plants terrestrial; rhizome thick, woody, densely scaly; fronds numerous, fasciculate, suberect, nonarticulate, stipe and rachis deciduously scaly; blade monomorphic, narrowed at both ends, simply pinnate, pinnae elongate, numerous, entire to subentire, glabrous, articulate and deciduous; veins free or casually anastomosing; sori round, dorsal or terminal upon veins, in 1–4 rows on each side of costa; indusia peltate, deciduous; spores bilateral, monolete, with a thick perispore; $x = 41$.

About six species, one widespread in the Neotropics and five in Southeast Asia, primarily at low elevations in wet forests. According to Copeland (1947), the affinities of *Cyclopeltis* are uncertain.

1. **Cyclopeltis semicordata** (Swartz) J. Smith, Bot. Mag. 72:Comp. 36. 1846.

—*Polypodium semicordatum* Swartz, Prodr. Veg. Ind. Occ. 132. 1788. —*Aspidium semicordatum* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):31. "1801" [1802]. —*Polystichum semicordatum* (Swartz) Moore, Ind. Fil. lxxxiv. 1857. —TYPE: Jamaica, *Swartz s.n.* (S?).

ILLUSTRATIONS: **Fig. 31**; Rovirosa, Pterid. Sur Mex. pl. 32. 1909; Vareschi, Fl. Venez. 1(1):pl. 70. 1969; Proctor, Fl. L. Antill. 2:232. 1977.

Rhizome erect to suberect, 10–15 cm long, 1.5–3 cm diam., apex densely clothed with tufted, light-brown, linear-attenuate scales; fronds 0.5–1.2 m long, stipe short, pale brown, adaxially sulcate, scaly at base; blade lanceolate, (0.4) 0.7–1.6 m long, 12–30 cm broad, pinnate, lowermost 2–5 pairs of pinnae somewhat shortened and deflexed; pinnae very numerous, alternate, linear-lanceolate, entire or slightly undulate, 6–16 cm long, 1–2 cm broad, sessile, strongly semicordate-auriculate, auricle basiscopic, overlying the brownish rachis; upper pinnae evenly reduced, terminal one usually lobate at base; veins close, spreading, 3–5-forked, 1–3 lower branches soriferous near their base, sori thus borne in 1–3 rows on both sides of costa; $n = 41$ (Jam.).

Stream banks and ravines in Tropical and Lower Montane rain forests, Seasonal Evergreen Forest; relatively common in Eastern and Northern highlands (not Jitotol Ridge), s Pacific Coastal Plain; 150–550 m. Southern Mex. (Tab.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Ven and Col. to Peru, Braz.?); Antill., Trin. CHIAPAS COLLECTIONS: *EM s.n.* (DS); *G 411* (K); *EM 18115* (DS, MEXU); *EM 18162* (DS, MEXU, US); *S 1694* (MEXU, US); *S&S 5470(391)* (US); *M&M 938* (UC, WIS); *20738*; *22520*; *25408*; *28577*; *32827*; *33357*; *33850*; *34186*; *42855*.

29. CYSTOPTERIS

Cystopteris Bernhardi, Neues J. Bot. 1(2):5, 26. "1806" [1805] (nom. cons.). —TYPE: *Cystopteris fragilis* (L.) Bernh. [≡*Polypodium fragile* L.].

Plants terrestrial or epipetric; rhizome compact to short-creeping, dictyostelic, scaly stipes with two vascular bundles at base (cross section); blade bi- to quadripinnatifid; veins free, entering either teeth or emarginations; leaf tissue often thin, herbaceous to chartaceous; glabrous on both sides; sori dorsal; indusia hoodlike, attached at base of receptacle on basiscopic side, elsewhere free, thin; paraphyses absent; spores bilateral, monolete, dark brown, with a perispore, this echinate, warted, or rugose; $x = 42$.

According to Blasdell (1963), *Cystopteris* comprises ten species, one of which is cosmopolitan. Most of the species are temperate, but a few are found at higher elevations in the tropics. The affinities of the genus are uncertain, but perhaps with *Athyrium* (Copeland, 1947).

REFERENCES: BLASDELL, R. F. 1963. A monographic study of the fern genus *Cystopteris*. Mem. Torrey Bot. Club 21(4):1–102; PEARMAN, R. W. 1976. A scanning electron microscopic investigation of the spores of the genus *Cystopteris*. Brit. Fern Gaz. 11:221–230.

1. **Cystopteris fragilis** (L.) Bernh., Neues J. Bot. 1(2):26, pl. 2, fig. 9. "1806" [1805].

—*Polypodium* "*F. fragile*" L., Sp. Pl. 2:1091. 1753 (an error for *Polypodium fragile*). —TYPE: uncertain, but Linnaeus cited an illustration in Plukenet's Almagestum Botanicum, pl. 180, fig. 5, 1696, which is based on Herb. Sloane 96, Folio 40 (BM). LINN 1251.51 is also this species, but may have been added to LINN after 1753 (Jackson, 1912). See Blasdell (1963) for discussion of typification and additional synonymy.

ILLUSTRATIONS: **Fig. 28**; Knobloch & Correll, Ferns Chih. 162, figs. 1–3. 1962.

Rhizome short-creeping, 2–4 mm diam., with lanceolate, brownish, shining, glabrous, entire scales at apex; fronds mostly 10–50 cm long; stipe mostly shorter than blade, stramineous to often reddish brown at base; blade bipinnate to quadripinnatifid, ovate-lanceolate with lowermost 1–2 pairs of pinnae slightly shortened, to 30 cm long, 12 cm broad; rachis and minor axes glabrous (ours) to glandular; veins ending in short emarginations or in teeth; indusia glabrous, with a subentire to lacerate apex; spores mostly echinate (ours), occasionally rugose; $n = 84$ (Chis., U.S., Eur.), 126, 168.

Terrestrial on moist banks, also on wet rocks along streams in Montane Rain Forest, Evergreen Cloud Forest, less often Pine-Oak Forest; common in Central Plateau, Northern Highlands (Jitotol Ridge), s and cen. Sierra Madre; 1200–3600 m. Canada, Alas., U.S., nearly throughout Mex. (Baja C.S., Chih., Dgo., Coah., Jal., Nay., Mich., Gro., D.F., Méx., Mlos., Pue., S.L.P., Ver., Oax.), Guat., C.R., Pan.; S.A. (Col. to Arg., Chile); Gr. Antill.; Eur.; Asia. CHIAPAS COLLECTIONS: *P 7234* (UC); *EM 4692* (MEXU); *G 211* (PH); *T&L 41766* (DS); *15111*; *22063*; *22290*; *22396*; *22650*; *22759*; *22824*; *22846*; *22938*; *23184*; *23254*; *24300*; *25780*; *25785*; *26052A*; *26710*; *26797*; *27247*; *27575*; *29352*; *31703*; *32070*; *32333*; *32618*; *32691*; *34404*; *34599*; *37334*; *39537*; *40384*; *40241*; *40445*; *40512*; *40801*; *41263*; *41624*.

In his monograph of the genus, Blasdell (1963) cited Chiapas specimens of both *C. fragilis* (*R 1054*, PH, not seen) and *C. diaphana* (*GM 60*, US, not seen).

He distinguished *C. diaphana* from *C. fragilis* primarily by the former having veins ending in emarginations, with the latter having veins ending in teeth. If this difference were to hold, then only a few Chiapas specimens from the summit of Volcán Tacaná (*24300*, *26710*, and especially *29352*) and perhaps a few from the top of Zontehuitz (e.g., *22063*) would be *C. fragilis*; nearly all of the remaining collections would be assignable to *C. diaphana*. The existence of intermediates between the two vein types with some specimens showing both conditions, complicates the picture. Blasdell (1963) interpreted these numerous intermediates as hybrids or introgressants (*C. diaphana* × *fragilis*) and ascribed to them a range much wider than that of *C. diaphana* itself and a range nearly as large as the cosmopolitan *C. fragilis* (Blasdell has annotated *G 211*, PH, from Chiapas, as this hybrid). However, Blasdell gave no cytological or spore-abortion data that might help support the putative hybridization thesis.

Pearman (1976:228), in a study of spore types in *Cystopteris*, doubted the existence of "true" *C. diaphana* (type from Réunion) in Central and South America. Within *C. fragilis*, Pearman found the echinate perine to be the most widespread type; this is also the type found in most Chiapas collections. Some of the high elevation Chiapas collections (e.g., *29352*) appear to have a slightly rugose perine, another of the types discussed for *C. fragilis* by Pearman. The taxonomic significance of these very diverse spore types is uncertain. Only a single Chiapas specimen was seen that showed probable spore abortion (*23254*).

Until the segregates in the *C. fragilis* complex are more adequately characterized, I follow a conservative course and recognize only a single species for Chiapas.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Cystopteris membranifolia Mickel —known from two localities, Oax. and Ver. Differs from *C. fragilis* in the narrow, long-creeping rhizome and thinner blade texture. An examination of spores (irregular and often abortive) and cytology (many univalents at meiosis) indicate that *C. membranifolia* may be a hybrid. Further study is needed.

30. DANAEA

Danaea J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:420. 1793 (nom. cons.). —TYPE: *Danaea nodosa* (L.) J. E. Smith [≡*Acrostichum nodosum* L.].

Plants terrestrial; rhizome creeping, ± glabrous; fronds dimorphic, the fertile moderately contracted; stipe bearing stipules at base; blade pinnate (simple in one sp.), with jointlike, swollen nodes at insertion of opposite pinnae, lower nodes often with reduced pinnae or pinnae wanting; veins free, simple or forking, ± parallel; sporangia in a double row along veins, fused into linear synangia, each sporangium opening by a terminal pore, synangia almost completely covering underside of fertile fronds; $x = 40$.

According to Copeland (1947), *Danaea* comprises 32 Neotropical species, but the genus is in need of monographic revision, especially in South America. The species are found mostly in lower elevation rain forests, frequently along streams. All three of the Chiapas species are very rare. Nine species are known in the region from Costa Rica to Chocó (Lellinger, pers. comm.) and four species from Jamaica (Proctor, 1953). *Danaea* is an isolated genus in the Marattiaceae and is regarded by some as the sole genus in a monotypic family Danaeaceae.

REFERENCE: UNDERWOOD, L. M. 1909. Marattiaceae. *In* North American Flora 16(1):17–23.

a. Sterile pinnae less than 2.5 cm broad; pinnae margins serrulate at tip; veinlets 18–20 per cm; stipes with 1–2 nodes . . . . 1. *D. cuspidata*
aa. Sterile pinnae 3 or more cm broad.
  b. Stipes with 1–5 nodes; pinnae 3–7 pairs, mostly acute at tip; veins 8–11 per cm . . . . 2. *D. elliptica*
  bb. Stipes without nodes; pinnae 8 pairs or more, acuminate with an attenuate tip; veins 11–15 per cm . . . 3. *D. nodosa*

1. **Danaea cuspidata** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:307. 1849.

—TYPE: Mexico, Oaxaca, "Chinantla inter Lobani and Petlapa," *Liebmann* (Liebm. Pl. Mex. 2184, Fl. Mex. 655 and 656) (C!).

Danaea munchii Christ *in* Rosenst., Repert. Spec. Nov. Regni Veg. 22:23. 1925. —TYPE: Mexico, Chiapas, San Pablo, *Münch 159* (presumably P; isotypes DS! US!). Based on the description in Bull. Herb. Boissier (2)5:734. 1905.

ILLUSTRATIONS: **Fig. 32**; Rovirosa, Pterid. Sur Mex. pl. 69. 1909 (as *D. stenophylla*); Stolze, Fieldiana, Bot. 39:15, fig. 3a. 1976.

Fronds mostly 50–120 cm long; stipe with (0) 1–2 nodes, with small, dark, appressed scales; sterile blade 30–60 cm long; pinnae linear-oblong, mostly 10–20 pairs and a conform terminal one, 10–16 cm long, to 2.5 cm broad, attenuate and serrulate at apex; costae below sparsely scaly, dark brown; veins distinctly paired in origin, 18–20 per cm, dark brown.

Probably in lower and middle elevation rain forests; rare in Northern Highlands, N Central Plateau; 950–2000 m. Southern Mex. (Oax.), Guat., C.R., Pan. CHIAPAS COLLECTIONS: *R 960* (PH); *GM 159* (DS, US).

2. **Danaea elliptica** J. E. Smith *in* Rees, Cycl. 11:Danaea no. 2. 1808.

—LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:48. 1977): Sloane Herb. 1:85, representing a plant from Jamaica, Mt. Diablo (BM).

ILLUSTRATIONS: Hooker & Greville, Icon. Fil. 1:pl. 52. 1827; Stolze, Fieldiana, Bot. 39:15, fig. 3b. 1976.

Fronds 30–90 cm long; stipe with 1–5 nodes, stramineous to brown, glabrous to sparsely dotted with appressed, brown scales; sterile blade 20–35 cm long, 12–30 cm broad; pinnae 3–7 pairs and a conform terminal one, oblique, ± elliptic, 8–17 cm long, 2–3.5 cm broad, slightly repand along margin, acute and entire at tip; costae glabrous or sparsely scaly below; veins simple or forked at their origin, 8–11 per cm, not noticeably darkened; n = 80 (Trin.).

Habitat in Chiapas not known, probably in lower elevation rain forests. Southern Mex. (Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col., Bol., s Braz.); Antill., Trin. CHIAPAS COLLECTION: *P 7247* (UC, US), "Finca San Cristobal." Sousa S. (Univ. Calif. Publ. Bot. 51:1–36. 1969) did not list this among Purpus localities, but it is most likely in the s Sierra Madre or Pacific Coastal Plain of Chiapas in the vicinity of Huixtla, where Purpus collected in June 1914.

3. **Danaea nodosa** (L.) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:420. 1793.

—*Acrostichum nodosum* L., Sp. Pl. 1070. 1753. —LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:47. 1977): Plumier's Tract. Fil. Amer. pl. 108, 1705, illustrating a plant from either Martinique or Haiti.

Danaea elata Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:306. 1849. —TYPE: Mexico, Veracruz, "Barranca de la Hac. de Jovo," 2500 ft, *Liebmann* (Liebm. Pl. Mex. 2199, Fl. Mex. 848) (C—folio!). Contrary to Liebmann, I do not find nodes on the stipe.

ILLUSTRATIONS: Hooker & Greville, Icon. Fil. 1:pl. 51. 1827; Stolze, Fieldiana, Bot. 39:15, fig. 3c. 1976.

Fronds 1–2 m long; stipe without nodes, about as long as blade, brown or purplish brown, mottled with numerous, small scales; sterile blade to 1 m long, rachis with appressed scales like those of stipe, darkest at nodes; pinnae 8–17 pairs and a conform terminal one, oblong, mostly 20–40 cm long, 3–5 cm broad; veins distinctly paired in origin, 11–15 per cm, not noticeably darkened.

In Tropical and Montane rain forests; uncommon in Northern and Eastern highlands; 300–1250 m. Southern Mex. (Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col., Peru, s Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *P 6760* (UC, US); *R 1080* (PH); *34139*; *38083*.

Another possible synonym is *D. media* Liebm. (Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:306. 1849. —TYPE: Mexico, Veracruz, "Barranca de la Hacienda de Jovo," *Liebmann s.n.*, Liebm. Pl. Mex. 2185, Fl. Mex. 653, 654, 849, and 850, the last two sheets folio, C!). The sterile pinnae are greater than 3 cm broad, more or less entire, and the stipe lacks nodes on all except one frond of sheet 849; this frond has two stipe nodes. The type material seems to be juvenile. Underwood placed *D. media* as a synonym of *D. elliptica* without comment.

31. DENNSTAEDTIA

Dennstaedtia Bernh., J. Bot. (Schrader) 1800(2):124. "1801" [1802]. —TYPE: *Dennstaedtia flaccida* (Forst.) Bernh. [≡*Trichomanes flaccidum* Forst.].

Terrestrial; rhizome long- to short-creeping, solenostelic, pubescent (but without scales); fronds generally large, 1-pinnate to usually tripinnate or more compound, usually broadest at base; veins free; leaf tissue glabrous or pubescent, hairs multicellular; sori marginal, terminal on veins, not paraphysate, indusia formed of inner (true) indusium and outer, opposed lobe of leaf tissue, these joined along base and sides to form a saucer-shaped to purse-shaped to cup-shaped, often deflexed structure; sporangia slender-stalked; spores tetrahedral; $x \doteq 33, 34, 46, 47$.

Tryon (1960) recognized 10 species in the Neotropics, with a single temperate species in eastern United States and southeastern Canada. One additional American species has been described since. There are many more species in the Old World, ranging from Japan to Polynesia westward to Southeast Asia. *Dennstaedtia* is evidently most closely related to *Microlepia* and *Hypolepis*, but the circumscriptions of these genera are far from satisfactory. All seven Chiapas species are wide-ranging in the American tropics.

REFERENCES: TRYON, R. 1960. A review of the genus *Dennstaedtia* in America. Contr. Gray Herb. 187:23–52. 1960; also Contr. Gray Herb. 194:18–29. 1964.

a. Axis of penultimate segments lacking perpendicular herbaceous wings on upper surface, or perpendicular wings present but the one on basiscopic side not decurrent onto axis of the next order; trichomes on undersurface of pinnules, when present, whitish to brownish and usually subopaque.
  b. Sterile vein tips, on upper surface, slender, not enlarged; tertiary axes glabrous to sparsely or densely pubescent beneath with straight to tortuous, more or less spreading trichomes.
    c. Pinnae alternate, lower ones stalked, with basal pinnules not or scarcely reduced; major axes tan to reddish brown; trichomes usually abundant on undersurface of pinnules, some of them short, acicular, rigid; cells of trichomes, except sometimes the lower ones, mostly several times longer than broad .... 3. *D. cicutaria*
    cc. Pinnae opposite or rarely subopposite, lower ones sessile, each with a pair of usually much reduced basal pinnules; major axes stramineous; trichomes sparse, rarely absent to usually rather abundant on undersurface of pinnules, rather tortuous, their cells mostly about twice as long as broad, or shorter .... 5. *D. distenta*
  bb. Sterile vein tips, on upper surface, enlarged, clavate to punctate, rarely slender; tertiary axes glabrate to usually subappressed-pubescent beneath, with trichomes more or less curled.
    d. Pinnules 1-pinnate to pinnate-pinnatifid; apical segments of pinnae separate or nearly so to the prolonged apex, the separate ones closest to tip obtuse.
      e. Mature sori, at least basal acroscopic ones on an ultimate segment, mostly 1.0–1.5 mm broad and about half as thick .... 4. *D. dissecta*

ee. Mature sori mostly 0.5–1.0 mm broad and about as thick .... 7. *D. obtusifolia*

dd. Pinnules entire to deeply pinnatifid; apical segments of pinnae confluent back of the prolonged apex, the separate ones closest to tip acute .... 1. *D. arborescens*

aa. Axis of penultimate segments bordered on each side, on upper surface, by a pronounced herbaceous wing perpendicular to plane of segment, wing on basiscopic side decurrent onto axis of next order either as an herbaceous wing or as a pronounced ridge; trichomes on undersurface of pinnules wholly clear brown or tan, relatively straight and rather rigid; sterile vein tips, on upper surface, mostly slender.

f. Basal segments of pinnules of central pinnae usually subopposite to nearly opposite, rather or quite equal in size, the basiscopic not or slightly ascending; leaf tissue usually dull, surface of upper epidermis (dry) minutely pebbled by individual epidermal cells; sori globular, to less often subglobular .... 6. *D. globulifera*

ff. Basal segments of pinnules of central pinnae definitely alternate, quite unequal in size, the inferior ascending to strongly ascending; leaf tissue usually shining, rarely dull, above and beneath, surface of upper epidermis (dry) minutely striate to sometimes nearly smooth; sori cylindrical to subcylindrical .... 2. *D. bipinnata*

1. **Dennstaedtia arborescens** (Willd.) Ekman ex Maxon, Proc. Biol. Soc. Wash. 43:88. 1930.

—*Davallia arborescens* Willd., L. Sp. Pl., ed. 4, 5:470. 1810. —Type: based on Plumier, Tract. Fil. Amer. pl. 6, illustrating a plant from Hispaniola (see Maxon, loc. cit.).

Illustrations: Tryon (1960:47, 51; 1964:27); Hooker, Sp. Fil. 1:pl. 30B. 1844 [as *Deparia mathewsii* Hook.].

Fronds ca. 1.5–3 m long; blade evidently ovate, bipinnate to subtripinnate; lowermost pinnae usually subsessile, basal pinnules reduced; apical segments of pinnae confluent back of the prolonged tip, separate ones closest to tip acute; axes of penultimate segments without perpendicular herbaceous wings on upper surface, or with them but wing on basiscopic side not decurrent onto axis of next order; sterile vein tips clavate to punctate, ending well back of glabrous margin; axes glabrate to usually pubescent beneath, trichomes brownish, subappressed, ascending, ± curled; leaf tissue glabrous, dark green, dull, thick-herbaceous; indusia purse-shaped to cup-shaped.

Presumably in Tropical Rain Forest; in Chiapas, known from a single collection (Palenque); ca. 300 m. Southern Mex. (Chis. only), Guat., C.R., Pan.; S.A. (Col. to Ven. and Bol.); Gr. Antill. (but not P.R.). Chiapas Collection: *GM 60* (DS, US).

2. **Dennstaedtia bipinnata** (Cav.) Maxon, Proc. Biol. Soc. Wash. 51:39. 1938.

—*Dicksonia bipinnata* Cav., Descr. Pl. 174. 1802. —*Dicksonia adiantoides* Willd., L. Sp. Pl., ed. 4, 5:488. 1810 (nom. superfl., illegit.). —*Dennstaedtia adiantoides* (Willd.) Moore, Ind. Fil. xcvii. 1857. —Type: probably Puerto Rico, *Ventenat s.n.* (MA; isotype B—Herb. Willd. 20165-1, photo GH; fragm. US).

Illustrations: Tryon (1960:39, 41; 1964:22).

Rhizome long-creeping, mostly 0.5–1.0 mm diam., densely hairy with stiff, stout, septate, castaneous hairs; fronds mostly 2–3 m long, with stipes ± equaling blades; blade deltoid, 3–4-pinnate-pinnatifid; lowermost pinnae long-stalked, alternate, to ca. 70 cm long, 20 cm broad, basal pinnules greatly to scarcely reduced; basal segment of pinnules of central pinnae alternate, unequal in size, the inferior ascending; axes of penultimate segments bordered on each side, on upper surface, by an herbaceous wing perpendicular to plane of segment, wing on basiscopic side decurrent onto axis of next order; sterile vein tips usually slender, ending well back of glabrous margin; axes below, especially near their base, with scattered stiff, clear brown, septate trichomes ca. 1 mm long; leaf tissue glabrous, dark green and often shining above, chartaceous to subcoriaceous; indusia cylindrical to subglobular; $n = 94$ (Jam.).

Margins of Lower Montane and Montane rain forests; widely scattered localities in the Northern Highlands, n edge of Central Plateau, cen. Sierra Madre; (400) 900–2100 m. Southern Mex. (Hgo., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Ven. and Bol.); Gr. Antill., Trin. Chiapas Collections: *G 356* (K, PH); *GM 155* (DS, US); *R 819* (K, PH); *23292*; *31493*; *32360*; *32630*; *34441*; *34620*.

3. **Dennstaedtia cicutaria** (Swartz) Moore, Ind. Fil. xcvii. 1857.

—*Dicksonia cicutaria* Swartz, J. Bot. (Schrader) 1800(2):91. "1801" [1802]. —Type: Jamaica, *Swartz s.n.* (S; fragment and photographs US; isotype: B—Herb. Willd. 20156).

Dicksonia rubiginosa Kaulf., Enum. Fil. 226. 1824. —*Dennstaedtia rubiginosa* (Kaulf.) Moore, Ind. Fil. xcvii. 1857. —Type: Brazil, Rio de Janeiro, Herb. Mertens (isotype LE, photo GH).

Dicksonia umbrosa Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:262. 1849. —Type: Mexico, Veracruz, "inter Colipa et Misantla," *Liebmann* [Liebm. Pl. Mex. 2663, Fl. Mex. 804] (C—folio! isotype US).

Illustrations: Tryon (1960:31; 1964:22).

Rhizome short-creeping, glabrescent?; fronds mostly 1.5–4 m long; blade deltoid, tripinnate-pinnatifid to often quadripinnate-pinnatifid; lowermost pinnae stalked and with basal pinnules not, or not much, reduced; axes of penultimate segments without herbaceous ridges or wings on upper surface; sterile vein tips slender, ending well back of margin; leaf tissue ± pubescent beneath (and often above), the hairs mostly whitish, acicular, rigid, 1-celled, short (mostly 0.2–0.3 mm long), also with a few longer, septate, lax, tannish hairs; most sori borne in a sinus; indusia saucer- to purse-shaped; $n = 94$ (Jam.).

In Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest; widely scattered localities in the Northern and Eastern highlands, Sierra Madre, ne corner of Central Plateau; 300–1500 m. Southern Mex. (S.L.P., Hgo., Ver., Mich., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz., n Arg.); Gr. Antill. Chiapas Collections: *G 367* (K); *P 7228* (US); *21864*; *22270*; *25072*; *25350*; *32517*; *34238*; *35056*.

4. **Dennstaedtia dissecta** (Swartz) Moore, Ind. Fil. 305. 1861.

—*Polypodium dissectum* Swartz, Prodr. Veg. Ind. Occ. 134. 1788 (not Forst., 1786). —*Dicksonia dissecta* Swartz, J. Bot. (Schrader) 1800(2):91. "1801" [1802]. —Type: Jamaica, *Swartz s.n.* (S, photograph and fragment US).

Dicksonia cornuta Kaulf., Enum. Fil. 227. 1824. —*Dennstaedtia cornuta* (Kaulf.) Mett., Ann. Sci. Nat. Bot. (5)2:260. 1864. —Type: Brazil, "Sprengel communicavit" [possibly a collection by *Sello,* fide Tryon, 1964].

ILLUSTRATIONS: **Fig. 33**; Tryon (1960:43; 1964:27).

Rhizome short-creeping; fronds ca. 1.5–3.5 m long; blade deltoid, tripinnate to nearly quadripinnate; lower pinnae usually subsessile, with basal pinnules reduced; axes of penultimate segments without perpendicular herbaceous wings on upper surface, or with them, but wing on basiscopic side not decurrent onto axis of next order; sterile vein tips, on upper surface, clavate to punctate, ending well back of glabrous margin; axes usually finely pubescent below, hairs short (ca. 0.2–0.3 mm long), multicelled, tortuous; leaf tissue ± glabrous below; mature indusia saucer- to purse-shaped, mostly 1.0–1.5 mm broad and about half as thick; n = ca. 47 (Jam.), 46 (Oax.), 47 (Chis.); $2n$ = ca. 94 (Jam.).

In Tropical, Lower Montane, and Montane rain forests, Evergreen Cloud Forest; relatively common in Sierra Madre, Northern Highlands, widely scattered in Central Plateau; 300–2300 m. Southern Mex. (Ver., Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Jam., Hisp., Trin. CHIAPAS COLLECTIONS: *GM s.n.* (DS); *GM 151* (DS, US); *G 368* (K); *31619*; *32210*; *32328*; *32825*; *33686*; *34200*; *34443*; *35232*; *38087*; *38928*.

According to Tryon (1960, 1964), *D. dissecta* differs from *D. obtusifolia* only in size and shape of indusia. I have searched for additional reliable differences but failed. However, there is an uncomfortably wide latitude of variation if only one species is recognized. Some of the variation seems not so significant when one realizes that the degree of fertility affects dissection of the blade in *D. dissecta,* i.e., fronds, or at least segments, tend to be subdimorphic. Sterile segments tend to be broadly obtuse and subentire, while fertile segments are often deeply lobed with sori along the acroscopic margin of a lobe. This dimorphism can be seen in several Chiapas specimens that show partial fertility, e.g., *35232, 38928, 31619.* The broader sori of *D. dissecta* are often fed by two veins rather than one, and I have seen various degrees of merger between two smaller sori to form a single purse-shaped sorus. Tryon (1960) in fact made the point of distinguishing between the basal sori (purse-shaped) and apical sori (resembling those of *D. obtusifolia*) in *D. dissecta.* Additional study is needed.

5. **Dennstaedtia distenta** (Kunze) Moore, Ind. Fil. 306. 1861.

—*Dicksonia distenta* Kunze, Anal. Pterid. 39. 1837. —TYPE: Mexico [Veracruz], Jalapa, *Schiede s.n.* (isotype NY, photo UC!).

ILLUSTRATION: Tryon (1960:35).

Rhizome scurfy-pubescent; fronds mostly 2–4 m long; blade deltoid, tripinnate-pinnatifid to often quadripinnate-pinnatifid below; major axes stramineous; lower pinnae subsessile and with basal pinnules much reduced; pinnules on lower pinnae opposite to subopposite; axes of penultimate segments without herbaceous ridges or wings on upper surface; sterile vein tips slender to narrowly clavate, ending well back of margin; leaf tissue sparsely pubescent to usually glabrous beneath; axes below sparsely to moderately hairy, hairs many-celled, lax or tortuous, whitish to tan, not shining; most sori borne in a sinus; indusia saucer- to cup-shaped; n = ca. 44 (Chis.).

Margins of Montane Rain Forest, Pine-Oak-Liquidambar Forest; relatively common in Sierra Madre, N portion of Central Plateau, uncommon in Northern Highlands (Jitotol Ridge); 1200–2300 m. Southern and w Mex. (Chih., Son., Dgo., Sin., S.L.P., Ver., Hgo., Méx., Mich., Gro., Oax.), Guat., Salv., Nic., C.R., Pan.; Jam., Hisp. CHIAPAS COLLECTIONS: *L&S 9877* (UC, US); *P 9196* (UC, US); *GM 10* (DS); *GM 154* (DS); *31455*; *31693*; *31889*; *32363*; *34619*.

In Chiapas, *D. distenta* usually occurs at higher elevation than does *D. cicutaria,* its closest relative.

6. **Dennstaedtia globulifera** (Poir.) Hieron., Bot. Jahrb. Syst. 34:455. 1904.

—*Polypodium globuliferum* Poir. *in* Lam., Encycl. Méth. 5:554. 1804. —TYPE: Plumier's Tract. Fil. Amer. pl. 30, 1705, illustrating a plant from Hispaniola.

ILLUSTRATIONS: Tryon (1960:39; 1964:22).

Rhizome long-creeping, ca. 1 cm diam., densely hairy with stiff, septate, castaneous hairs; fronds (1) 2–3 m long; blade deltoid, tripinnate to nearly quadripinnate; lowermost pinnae alternate, stalked, to ca. 65 cm long, 30 cm broad, with basal pinnules not or scarcely reduced; basal segments of central pinnae subopposite, nearly or quite equal in size, inferior one not or slightly ascending; axes of penultimate segments bordered on each side, on upper surface, by an herbaceous wing perpendicular to plane of segment, wing on basiscopic side decurrent onto axis of next order; sterile vein tips usually slender, ending well back of glabrous margin; axes and veins below, especially toward their axils, bearing stiff, clear brown, septate trichomes ca. 1 mm long; leaf tissue glabrous, herbaceous, not shining; indusia ± globular; n = ca. 47 (Jam.).

Margins of Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; widely scattered localities in the Sierra Madre, Northern Highlands, SE corner of Central Plateau; 900–2100 m. Eastern and s Mex. (Tam., Ver., Hgo., Mlos., Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Ven. and N Arg., s Braz., Urug., Parag.); Gr. Antill. CHIAPAS COLLECTIONS: *21616*; *22305*; *22653*; *24809*; *25757*; *31351*; *42629*.

7. **Dennstaedtia obtusifolia** (Willd.) Moore, Ind. Fil. 306. 1861.

—*Dicksonia obtusifolia* Willd., L. Sp. Pl., ed. 4, 5:483. 1810. —TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 20163, photo US).

Dicksonia ordinata Kaulf., Enum. Fil. 226. 1824. —*Dennstaedtia ordinata* (Kaulf.) Moore, Ind. Fil. 306. 1861. —TYPE: Puerto Rico, *Ventenat s.n.*

ILLUSTRATIONS: Tryon (1960:43, 47; 1964:27); Kunze, Farrnkr. 2:pl. 106. 1848 [pl. 106b is possibly a drawing of the type plant]; Proctor, Fl. L. Antill. 2:116. 1977.

Similar to *D. dissecta,* apparently differing only in the mature indusia mostly 0.5–1.0 mm broad and about as thick; n = ca. 47 (P.R.).

I tentatively list here two Chiapas specimens, collected in Montane Rain Forest and Evergreen Cloud Forest; s Sierra Madre, Central Plateau; ca. 2300 m. Otherwise known from Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz., Parag.); Antill., Trin. CHIAPAS COLLECTIONS: *31969* (sterile); *33693*.

Breedlove 33693 was collected at the same locality and day as *33686,* which is more or less typical *D. dissecta.* These two collections differ greatly in dissection and color and *33686* bears scattered, stout, conical trichomes on the leaf tissue above; such trichomes are lacking in *33693.* Still, *33693* is not quite typical of *D. obtusifolia.* Additional study is needed of the relationship between *D. obtusifolia* and *D. dissecta* (which see for additional discussion).

32. DICKSONIA

Dicksonia L'Héritier, Sertum Anglicum 30. "1788" [1789]. —Lectotype (first chosen by Presl, Tent. Pterid., 1836): *Dicksonia arborescens* L'Héritier.

Balantium Kaulf., Enum. Fil. 228. 1824. —Lectotype (following Maxon, J. Wash. Acad. Sci. 12:455. 1922): *Balantium auricomum* Kaulf. [=*Dicksonia arborescens*].

Plants arborescent; stem apex and stipe bases densely clothed with bristlelike hairs; fronds large, coriaceous, blade bipinnate-pinnatifid to tripinnate, not abscissing cleanly, narrowed towards base, subdimorphic with fertile blade contracted; sori marginal, indusia bivalvate, the outer valve being a modified, concave tooth of the frond, inner valve a true indusium; sporangia on all sides of the short receptacle, maturing basipetally; annulus conspicuous, somewhat oblique, not interrupted by the pedicel; spores tetrahedral, without a perispore; $x = 65$.

According to Copeland (1947), there are about 25 species, 8 in the Neotropics, 1 from St. Helena, and the rest from New Zealand and Tasmania to Java and the Philippines. Dicksonias are chiefly ferns of moist cloud forests at middle to relatively high elevation. A single species occurs in Chiapas; most of the remaining Neotropical species are South American.

Reference: Maxon, W. R. 1913. Studies of tropical American ferns—No. 4. Contr. U.S. Natl. Herb. 17:133–179.

1. Dicksonia gigantea Karst., Fl. Columb. 2:177, pl. 193. 1869.

—Type: Colombia, Andes of Bogota, "montis Guadeloupe," *Karsten s.n.*

Dicksonia ghiesbreghtii Maxon, Contr. U.S. Natl. Herb. 17:155. 1913. —Type: Mexico, Chiapas, *Ghiesbreght 353* (US; isotype K).

Illustrations: **Fig. 34**; also Maxon, Annual Rep. Board Regents Smithsonian Inst. 1911:pl. 1, B, pl. 14 (as *D. navarrensis*); Stolze, Fieldiana, Bot. 39:101. 1976.

Trunk to 5 m high, 15 cm diam., apex and stipe bases clothed with dense castaneous, septate, shining hairs to 5 cm long; stipe relatively short, ca. 10–20 cm long, to 1.5 cm diam.; blade essentially 3-pinnate, the primary pinnae linear-oblong, acuminate, ± equilateral, to 70 cm long, 20 cm broad, mostly alternate; costae tan, covered with articulate, turgid, yellowish hairs to 5 mm long; pinnules contiguous, alternate, sessile, 8–12 cm long, 2–2.5 cm broad, costules clothed below with spreading hairs like those of costae, above strigose; segments 15 or more pairs below the deeply serrate apex, oblong, straight, or subfalcate, 10–15 mm long, 3–3.5 mm broad, margin somewhat revolute; sterile segments serrate to sharply and obliquely incised, fertile segments pinnatifid ca. ⅔ distance to costule, lobes cucullate, usually broader than long, rounded, often slightly emarginate; veins 5–8 pairs, those of sterile segments mostly 1–2-forked, those of fertile segments simple or 1-forked, sorus borne at end of distal branch; sori mostly 4–5 pairs, ca. 1 mm broad; paraphyses numerous, to ca. 1 mm long, flaccid, tan, septate.

Understory in Montane Rain Forest, Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1700–2800 m. Southern Mex. (Gro., Pue., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col.). Chiapas Collections: *P 6768* (UC, US); *P 6716* (PH, UC, US); *G 352* (YU); *G-P 2521* (MEXU); *GM 104* (DS); *15197*; *23214*; *32397*; *32654*.

Maxon (1913) distinguished *D. ghiesbreghtii* from *D. gigantea* primarily on the basis of the former having 7–8 pairs of veins per segment (5–6 pairs per segment in *D. gigantea*). This distinction is very slight and seems of little significance even if it did hold up, which it apparently does not; most Chiapas specimens have 5–6 pairs of veins per segment.

33. DICRANOPTERIS

Dicranopteris Bernhardi, Neues J. Bot. 1(2):38. "1806" [1805] (nom. nov. for *Mertensia* Willd.). —*Mertensia* Willd., Kongl. Vetensk. Acad. Nya Handl. 25:165. 1804 (not Roth, 1797). —Lectotype: (chosen by Bernhardi, Neues J. Bot. 1(2):38. 1805): *Polypodium dichotomum* Thunb. ex Murray [≡*Dicranopteris dichotoma* (Thunb. ex Murray) Bernh.] ≡*Mertensia dichotoma* (Thunb. ex Murray) Willd.

Hicriopteris Presl, Epim. Bot. 26. "1849" [1851]. —Type: *Hicriopteris speciosa* Presl [≡*Dicranopteris speciosa* (Presl) Holttum].

For details of typification and nomenclature, see Pichi Sermolli, Webbia 26:491–536. 1972.

Rhizome long-creeping, hairy; fronds pinnate, or pseudodichotomous at top of stipe, pinnae repeatedly pseudodichotomous, often with a pair of foliaceous stipulelike outgrowths at each forking except ultimate ones, only stipules and ultimate branches foliaceous; veins forked two or more times; sori typically of more than 6 sporangia; $x = 39, 43$.

A pantropical genus of about 10 species, with about four species in the New World. *Dicranopteris, Gleichenia, Sticherus,* and *Diplopterygium* are members of the isolated family, Gleicheniaceae.

Reference: Maxon, W. R. 1909. Gleicheniaceae. Pp. 53–63 *in* North American Flora 16(1).

Accessory pinnae (not to be confused with the foliaceous stipules) present at all but the ultimate nodes ...... 1. *D. flexuosa*
Accessory pinnae wanting .... 2. *D. pectinata*

1. **Dicranopteris flexuosa** (Schrader) Underw., Bull. Torrey Bot. Club 34:254. 1907.

—*Mertensia flexuosa* Schrader, Gött. Gel. Anz. 1824:863. 1824. —*Gleichenia flexuosa* (Schrader) Mett., Ann. Lugd. Bat. 1:50. 1863. —Type: Brazil, Espírito Santo, *Wied-Neuwied s.n.* (BR, photo BM!).

Illustrations: Sturm *in* Martius, Fl. Bras. 1(2):pl. 17. 1859 [as *Mertensia rigida* Kunze]; Martius, Icon. Pl. Crypt. Bras. pl. 60, fig. 1. 1834; Vareschi, Fl. Venez. 1(1):pl. 38. 1969; Small, Ferns SE States 330. 1938; Stolze, Fieldiana, Bot. 39:43, fig. 10a. 1976.

Similar to *D. pectinata* but differing in the primary nodes at their base bearing spreading or usually deflexed, oblong to lanceolate, pectinate accessory pinnae, larger ones 8–13 cm long, to 2.5 cm broad, those of upper nodes gradually smaller; primary axis straight, secondary leaf axes invariably wanting; *n* = ca. 78 (Jam.?), 68 (Braz.).

Steep-walled ravine with Seasonal Evergreen Forest; rare in Northern Highlands, 3 km N of Ocozocoautla; 900 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol., s Braz., Parag.); s Ala., Antill., Trin. Chiapas Collection: *21967*.

2. **Dicranopteris pectinata** (Willd.) Underw., Bull. Torrey Bot. Club 34:260. 1907.

—*Mertensia pectinata* Willd., Kongl. Vetensk. Acad. Nya Handl. 25:168, pl. 4. 1804. —Type: Venezuela, "ad Caracas," *Bredemeyer* (B—Herb. Willd. 19465).

Gleichenia nitida Presl, Rel. Haenk. 1:70. 1825. —Type: Mexico, *Haenke s.n.* (PR, fragm. US).

Mertensia glaucescens Humb. & Bonpl. ex Willd. var. *mexicana* Fée, Mém. Fam. Foug. 11:121. 1866. —Type: Mexico, *Galeotti 6402* (presumably P).

Illustrations: **Fig. 35**; Hooker & Greville, Icon. Fil. 1:pl. 14. 1827 [as *Gleichenia hermannii*]; Raddi, Pl. Bras. 1:pl. 6. 1825; Stolze, Fieldiana, Bot. 39:43, fig. 10, b–c. 1976; Proctor, Fl. L. Antill. 2:58. 1977.

Plants laxly ascending, eventually declining; rhizome 3–5 mm diam., conspicuously scabrous from persistent bases of numerous, deciduous, castaneous, articulate hairs; primary leaf axis at first erect, stout, 3–6 mm diam., stramineous to light brown; primary lateral branches several pairs, opposite, stipulate, repeatedly and unequally pseudodichotomous, a falsely sympodial, naked, flexuous, secondary axis formed by the alternate production of unequal secondary branches, shorter ones bearing a pair of pinnae or again unequally forked and bearing two pairs of pinnae; lower nodes of lateral branches inconspicuously stipulate; included terminal bud of each dichotomy abortive; pinnae 10–25 cm long, 1.5–6 (9) cm broad, sessile, pectinate (outer basal segments often somewhat prolonged), unequally lanceolate or oblong-lanceolate to linear, attenuate, glaucous below, glabrous to glabrate or having costae and veins sparsely clothed with deciduous, stellate or substellate, slender, ferruginous scales; segments linear-oblong, connected by a narrow wing; veins 3–5-forked, slightly elevated below; sori multisporangiate, nearly medial, borne upon distal veinlet of each group; *n* = 43 (Chis., Jam., Trin.), 44 (P.R.).

Forming extensive thickets along roadsides and other cleared areas, adjacent to Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Montane Rain Forest; scattered in Northern Highlands, N Sierra Madre, Central Plateau; 800–1600 m. Southern Mex. (Méx., Gro., Oax., Pue., Ver.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Bol. and Fr. Gui., Braz.); Antill., Trin. Chiapas Collections: *MC 1834* (US); *R&R&M 1163* (US); *15010*; *22230*; *25149*; *28121*; *29650*; *32152*; *36650*; *36958*; *38883*; *42093*.

34. DICTYOXIPHIUM

Dictyoxiphium Hook. *in* Hook. & Bauer, Gen. Fil. pl. 62. 1840. —Type: *Dictyoxiphium panamense* Hook.

The genus with characters of its sole species. *Dictyoxiphium* is apparently most closely related to *Tectaria*. Maxon (J. Wash. Acad. Sci. 24:549–557. 1934) suggested that *Dictyoxiphium* was able to hybridize with a species of *Tectaria* to form the peculiar genus *Pleuroderris*. This hypothesis has not yet been proven.

1. **Dictyoxiphium panamense** Hook. *in* Hook. & Bauer, Gen. Fil. pl. 62. 1840.

—Type: Panama, Isthmus, Pacific coast, *Cuming 1124* (K!—2 sheets).

Illustration: **Fig. 36.**

Plants terrestrial; rhizome short, erect, caudex ca. 1 cm diam., bearing brown, lanceolate, entire scales at apex; fronds subdimorphic, the sterile with blade narrowly elliptic, to ca. 60 cm long, the fertile longer, to ca. 90 cm long; sterile blade ca. 5–6 cm broad at middle, acute distally, long-attenuate nearly to stipe below, midrib below with scattered, persistent scales; venation areolate, with ± parallel and straight main lateral veins giving rise to a complex network of areoles, some of these with included, simple, or forking free veins; fertile blades linear, 1–2 cm broad, tapering to rhizome or with a short stipe ca. 3 cm long; leaf tissue glabrous on both sides; sporangia marginal, in an uninterrupted line, with a tan, extrorse, entire indusium ca. 0.5 mm wide; spores bilateral, with a perispore.

In Tropical Rain Forest; rare in Eastern Highlands (near Guatemala border) and Gulf Coastal Plain; 300 m. Southern Mex. (Oax.), Bel., Guat., Nic., Pan.; S.A. (Col.). Chiapas Collections: *EM 3606* (MEXU, US); *34167*.

35. DIDYMOCHLAENA

Didymochlaena Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:303. 1811. —Type: *Didymochlaena sinuata* Desv. [=*D. truncatula* (Swartz) J. Smith].

Plants terrestrial; rhizome suberect to erect, massive, scaly; stipes fascicled, scaly at base, with numerous meristeles; blade bipinnate; pinnules subsessile, articulate, oblong, subdimidiate; veins free, forked, enlarged at submarginal apices; sori terminal on veins, elongate, somewhat impressed, an elliptic indusium rounded at distal end, cordate or sagittate at base, fixed to vein along medial line; spores bilateral, with a dark brown perispore; $x = 41$.

As usually construed, *Didymochlaena* is a monotypic, pantropical genus. It is evidently allied to certain "aspidioid" genera such as *Polystichum,* but the affinity is probably not close.

1. Didymochlaena truncatula (Swartz) J. Smith, J. Bot. (Hooker) 4:196. 1841.

—*Adiantum lunulatum* Houttuyn, Nat. Hist. 2(14):209, pl. 100, fig. 1. 1783 (not Burm., 1768). —*Aspidium truncatulum* Swartz, J. Bot. (Schrader) 1800(2):36. "1801" [1802]. —TYPE: Java, collector not stated.

ILLUSTRATIONS: **Fig. 37**; Rovirosa, Pterid. Sur Mex. pl. 31. 1909; Holttum, Fl. Malaya, 2, Ferns 488. 1954.

Fronds usually 1–2 m tall, with stipe shorter than blade, densely scaly at base and with scattered scales upwards, scales to 3 cm long, tan to brownish, concolorous, linear-lanceolate; blade with up to 20 pairs of alternate, lateral pinnae and a ± conform terminal one, mostly 15–25 (30) cm long, lowermost pinnae somewhat shortened; pinnules oblong, 1.0–2.5 cm long, 0.5–1.0 cm wide, rounded or crenate at apex, basal ones of each pinna somewhat smaller; leaf tissue glabrous on both sides, chartaceous, dark green; sori 3–5 per pinnule, along acroscopic side or 1–2 at tip of pinnules, 2–3 mm long, with a broad, tan, entire-margined indusium; $n = 41$ (C.R., Males.).

In Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; uncommon in Northern and Eastern highlands, SE Central Plateau; 400–1350 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to S Braz., N Arg.); Cuba, Hisp.; Afr. and Asia. CHIAPAS COLLECTIONS: *GM s.n.* (DS); *Dr 1607* (MEXU, US); *R 820* (PH); *29857*; *32515*; *32902*; *38963*; *42012*.

36. DIPLAZIUM

Diplazium Swartz, J. Bot. (Schrader) 1800(2):61. "1801" [1802]. —LECTOTYPE: (first chosen by J. Smith?, Hist. Fil. 325. 1875): *Asplenium plantagineum* L. [≡*Diplazium plantaginifolium* (L.) Urban].

Plants terrestrial; rhizome usually suberect to erect, dictyostelic, scaly at apex; stipe with two crescent-shaped vascular bundles at base; blade simple to usually pinnate or more divided; veins commonly free; hairs mostly lacking on leaf tissue and veins; sori linear, produced ± equally on both sides of veins, each with a linear indusium (this rudimentary or lacking in a few species); sporangia ± sessile; spores reniform, monolete, with a winged perispore; $x = 41$.

Pantropical. Copeland (1947) estimated about 600 species for his genus *Athyrium,* which he defined to include *Diplazium*. *Diplazium* comprises a far greater number of species than *Athyrium* s.s. Maxon (Sci. Surv. Porto Rico 6:439. 1926) estimated about 350 species for *Diplazium*; the number of species in the Neotropics probably exceeds 100. Most species occur in wet forests, nearly always terrestrially. Vegetative reproduction by buds from the rachis occurs in several species.

a. Fronds simple .... 10. *D. plantaginifolium*

aa. Fronds 1–4-pinnate.

b. Pinnae entire, or dentate or serrate, not lobed.

c. Lateral pinnae one pair, with a similar terminal pinna; pinnae often with bud in axil .... 13. *D. ternatum*

cc. Lateral pinnae two or more pairs.

d. Rachis proliferous toward blade apex .... 9. *D. obscurum*

dd. Rachis not proliferous, or proliferous in axil of lower pinna.

e. Lateral pinnae 5 or fewer pairs; pinnatifid apex as long or longer than rest of blade .... 15. *D. vera-pax*

ee. Lateral pinnae 7 or more pairs; pinnatifid apex much shorter than rest of blade.

f. Blade broadly deltoid; pinnae inequilateral at base .... 16. *D. werckleanum*

ff. Blade lanceolate; pinnae ± equilateral at base .... 14. *D. urticifolium*

bb. Pinnae shallowly to deeply lobed, or more divided.

g. Pinnae shallowly lobed about half or less their width.

h. Largest pinnae more than 4 cm broad; costae, stipe, and rachis dark purplish brown; bud(s) in axil(s) of distal pinna(e) .... 8. *D. neglectum*

hh. Largest pinnae less than 2.5 cm broad; axes stramineous to tan; buds absent (infrequently present in *D. werckleanum*).

i. Lower pinnae lobed nearly half their width; leaf tissue drying dark green.

j. Rachis subflexuose; veins prominent below, stramineous; leaf tissue subcoriaceous; sori close on individual segments .... 11. *D. prominulum*

jj. Rachis straight; veins not prominent below, usually tan; leaf tissue thin-chartaceous; sori distant on segments, or 1 pair per segment .... 1. *D. cristatum*

ii. Lower pinnae lobed ca. ¼ their width or less, often only on acroscopic side; leaf tissue drying dark green to bluish green .... see couplet (f)

gg. Pinnae lobed more than half their width, or fronds bipinnate or more divided.

k. Pinnae deeply pinnatifid.

l. Pinnules oblique with respect to costa, acute at tip.
  m. Segments usually falcate, acute to acuminate at tip; pinnae mostly 20–25 cm long, 3.5–6.0 cm broad .... 2. *D. drepanolobium*
  mm. Segments usually straight, rounded to acutish at tip; pinnae mostly 5–16 cm long, 2–4 (6) cm broad .... 7. *D. lonchophyllum*
ll. Pinnules at right angles to costa, rounded and serrate at tip.
  n. Pinnae greater than 20 cm long; stipe and rachis dark brown to atropurpureous; bases of costules with darkened septate hairs, axes elsewhere and leaf tissue glabrous; exindusiate or with obscure indusium .... 6. *D. lindbergii*
  nn. Pinnae mostly less than 15 cm long; stipe and rachis stramineous to light brown; costae and leaf tissue below minutely hairy, hairs whitish; indusiate .... 12. *D. striatum*
kk. Pinnae 1-pinnate or more, at least the lower pinnae.
  o. Blade tripinnate-pinnatifid .... 4. *D. herbaceum*
  oo. Blade 2-pinnate to tripinnatifid.
    p. Pinnules equilateral, segments obtuse to rounded at tip .... 5. *D. hians*
    pp. Pinnules inequilateral, segments acute at tip.
      q. Medial and distal pinnae merely deeply pinnatifid .... 2. *D. drepanolobium*
      qq. Medial and distal pinnae fully bipinnate .... 3. *D. franconis*

1. **Diplazium cristatum** (Desrouss.) Alston, J. Bot. 74:173. 1936.

—*Meniscium cristatum* Desrouss. *in* Lam., Encycl. Méth. 4:94. 1797. —TYPE: Martinique, *J. Martin s.n.*, (P—LA!).

Asplenium denticulosum Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:323. 1811. —*Diplazium denticulosum* (Desv.) C. Chr., Ind. Fil. 231. 1905. —TYPE: "in America calidiore," *Dombey* (P—JU! isotype P!).

Asplenium arboreum Willd., L. Sp. Pl., ed. 4, 5:320. 1810. —*Diplazium arboreum* (Willd.) Presl, Tent. Pterid. 114. 1836. —TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19892-1).

Asplenium shepherdii Spreng., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 10:231, pl. 17, figs. 5–6. 1821. —TYPE: Jamaica, *Shepherd s.n.*

ILLUSTRATION: see under synonym, above.

Similar to *D. werckleanum* and *D. lonchophyllum*, differing from former in the more deeply lobed pinnae (about halfway to costa) with lobes serrate; from *D. lonchophyllum*, it differs in the smaller fronds, generally serrate segments, and basal acroscopic lobe not free; $n = 41$ (C.R.), ca. 82 (Jam.).

In Montane Rain Forest, Evergreen Cloud Forest, also Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1300–2700 m. Southern Mex. (Chis. only ?), C.R., Pan.; S.A. (Ven., Bol., s Braz., N Arg., Parag.); Antill., Trin. CHIAPAS COLLECTIONS: *7374*; *9295*; *22652*; *29210*; *32754*?

This is a problematic species in Chiapas. Specimens assigned here are difficult to place in either *D. lonchophyllum* or *D. werckleanum* and in fact are somewhat intermediate between the two species. Monographic study is needed.

Diplazium cristatum appears to grow at generally higher elevations than *D. lonchophyllum* in Chiapas.

2. **Diplazium drepanolobium** A. R. Smith, Amer. Fern J. 70:21. 1980.

—TYPE: Mexico, Chiapas, 10 km above Rayon, *Breedlove 26122* (DS!).

ILLUSTRATION: none.

Similar to *D. lonchophyllum*, but segments more strongly oblique and falcate, acute to acuminate at tip; fronds generally larger, with pinnae mostly 20–25 cm long, 3.5–6.0 cm broad.

Lower Montane and Montane rain forests, infrequently Seasonal Evergreen Forest; locally common in the Northern Highlands; (100) 550–1200 (1700) m. Southern Mex. (Ver.), Guat.? CHIAPAS COLLECTIONS: *R 59* (K, PH); *G 361* (K); *20760*; *22451*; *24163*; *26122*; *32852*; *38162*; *38676*.

This may be only an extreme variant of *D. lonchophyllum*, but it has very distinctive cutting and seems at least as distinct as some other segregates of *D. lonchophyllum* (e.g., *D. prominulum* and *D. subsilvaticum* Christ). Relatively few specimens are truly intermediate between *D. drepanolobium* and *D. lonchophyllum*; one such specimen is *21624-A*, from the Northern Highlands. This collection has abortive spores and may be a hybrid. More numerous are the intermediates between *D. drepanolobium* and *D. franconis*; these collections are discussed under the latter species. The best course in this difficult group seems to be to recognize three species from Chiapas, *D. lonchophyllum*, *D. drepanolobium*, and *D. franconis*. The alternative is to recognize a single species, a treatment that no one has recommended.

On the basis of certain collections identified by Fée (e.g., *Schaffner 470*, P!), I have at first identified this species as *D. acutale* Fée. However, the type of *D. acutale* is referable to *D. lonchophyllum*.

3. **Diplazium franconis** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:256. 1849.

—TYPE: Mexico, Oaxaca, Distr. Villa Alta, "inter Tonaguia et Roayaga," *Leibmann* [Liebm. Pl. Mex. 2664, Fl. Mex. 790, 791, 792] (C!—folio herb.; isotypes K! P!). I choose Fl. Mex. 790 as lectotype.

Asplenium aspidiiforme Fée, Gen. Fil. 199. 1852. —TYPE: Mexico [Oaxaca], Tepitongo, *Galeotti 6483* (presumably P, not found; isotypes P—2 sheets!).

Asplenium distans Fée, Gen. Fil. 198. 1852, not D. Don, 1825. —TYPE: Mexico, Oaxaca, Cerro San Martín, *Galeotti 6529* [6579 in protologue] (isotype P! photo US). See Morton, Contr. U.S. Natl. Herb. 38:221, 1973, for discussion.

Diplazium camptocarpon Fée, Mém. Fam. Foug. 8:84. 1857. —TYPE: Mexico, Veracruz, Cordoba, *Nieto s.n.* [transmitted by Schaffner, no. 69] (not found at P).

Asplenium franconis var. *gracile* Fourn., Mex. Pl. 1:109.

1872. —Type: Mexico, Chiquihuite, *Bourgeau 2149bis* (P—2 sheets!).
Asplenium hahnii Fourn., Mex. Pl. 1:109. 1872. —*Diplazium hahnii* (Fourn.) C. Chr., Ind. Fil. 233. 1905. —Type: Mexico, Veracruz, Mt. Escamela [near Orizaba], *Hahn s.n.* (P! photos UC! US).
Diplazium donnell-smithii Christ, Bull. Herb. Boissier (2)7:270. 1907. —Type: Honduras, San Pedro Sula, *Thieme s.n.* (Donn.-Smith 5680) (P—not found).
Illustration: no good one found.

Rhizome erect, caudex 1.5–3.0 cm diam.; fronds mostly (50) 75–170 cm long; stipe 2–5 mm diam., stramineous to tan, with linear-lanceolate brownish scales at base; blade broadly deltoid, bipinnate-pinnatifid at base; pinnae inequilateral, with basiscopic pinnules shorter and more oblique than acroscopic ones; largest pinnae (10) 15–25 cm long, to 5 cm broad, with up to ca. 5 pairs of free pinnules, these sessile to short-stalked, basal basiscopic one of lower pinnae usually reduced; largest pinnules with a ± free acroscopic basal lobe, otherwise pinnatifid to serrate, leaf tissue glabrous, chartaceous to subcoriaceous; indusia thin, tan, subentire, ca. 0.4–0.5 mm wide; 41 II + 75 I at first metaphase (Oax.), $n = 82$ (Oax.).

Mostly in Montane Rain Forest, Evergreen Cloud Forest, infrequently Pine-Oak-Liquidambar Forest, Lower Montane Rain Forest; common in Northern Highlands (especially Jitotol Ridge), Central Plateau, Sierra Madre; (900) 1200–2800 m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic., C.R. Chiapas Collections: *P 7250, 7251* (UC, US); *GM 4*, pt. (DS); *Li s.n.* (P); *L&S 9881* (US); *R&R&M 1246* (US); *G 360* (K, NY, PH); *Li s.n.* (P, photo UC); *T&L 41698, 41703* (DS); *21415*; *21421*; *21985?*; *22598*; *22670*; *22671*; *23130*; *23195*; *24096*; *24986*; *31480*; *31623*; *31814*; *32357*; *32679*; *34372*; *34406*; *34624*; *34691*; *36649*; *38930*; *42520*; *42531*.

A remarkably variable species; I have been unable adequately to distinguish entities such as *D. hahnii* and *D. donnell-smithii,* which have larger, subtripinnate blades with pinnules patent rather than oblique.

Hybridization has probably obscured the species limits in this group of *Diplazium*. Several Chiapas collections are intermediate between *D. franconis* and *D. drepanolobium,* e.g., *22293, 22484,* and *27480*. All of these collections have abortive spores. They grow with *D. drepanolobium,* but *D. franconis* has not yet been found growing with these intermediates.

4. **Diplazium herbaceum** Fée, Crypt. Vasc. Brés. 1:80, pl. 23, fig. 1. 1869.

—Type: Brazil, Rio de Janeiro, *Glaziou 2062* (presumably P).
Illustration: see original.

Blade 3-pinnate-pinnatifid at base, penultimate segments partially adnate and decurrent, shallowly lobed; leaf tissue herbaceous, dull green; sori to ca. 4 mm long, with a very narrow, entire, thin, tan indusium ca. 0.2–0.3 mm wide; scales absent from costae and costules below.

Known from a single Chiapas collection in s Pacific Coastal Plain (Finca Mexiquito). Elsewhere, known from C.R.; S.A. (s Braz.). Chiapas Collection: *P 7112* (UC).

The disjunct distribution of this species is surprising. The sole Chiapas specimen agrees nearly perfectly with Brazilian specimens seen, including *Glaziou 2061* (P!).

5. **Diplazium hians** Kunze ex Klotzsch, Linnaea 20:361. 1847.

—Type: Venezuela, *Moritz 289* (isotypes K—2 sheets!).
Diplazium amplum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:256. 1849. —Type: Mexico, Veracruz, Mirador, *Liebmann* [Liebm. Pl. Mex. 2384, Fl. Mex. 796, 797, 798, 799] (C—folio herb.!; isotype K!). I choose Fl. Mex. 799 as lectotype.
Illustration: no good one found.

Rhizome presumably stout, erect; fronds very large, to 2 m long, with stipe to ca. 1 cm diam., brownish below, stramineous distally; blade deltoid, bipinnate-pinnatifid, pinnate-pinnatifid only at tip; largest pinnae equilateral, stalked to 4 cm, patent, to ca. 40 cm long, 15 cm broad, with basal pinnules somewhat shortened; ultimate segments 3–6 mm broad, obtuse, subentire to serrate; veins simple to 1-forked on ultimate segments; costae and costules below bearing a few fibrillose to ovate-lanceolate brownish scales; leaf tissue ± glabrous below; sori short, straight, mostly 1–2 mm long; indusia thin, tan, very broad (0.5–1.0 mm), subentire to erose along the margin; "n" = 328 (Jam.).

In Montane Rain Forest; Northern Highlands (especially Jitotol Ridge), also NE edge of Central Plateau; 1100–2000 m. Southern Mex. (Ver., Oax.), Nic.; S.A. (Ven., Ecu., s Braz.); Jam. Chiapas Collections: *GM s.n.* (DS); *G 362* (K, NY, PH); *R 964* (PH); *15402*; *23133*; *34613*.

Diplazium hians appears to be widespread in tropical America, but its exact distribution is uncertain because *Diplazium* has been so little studied and species determinations are difficult. There are probably many synonyms of *D. hians,* and it is not unlikely that an older name will be found when the genus is studied monographically. One possible synonym is *Asplenium bogotense* Karst.

Specimens of this species from southern Mexico have usually been identified as *D. amplum*. However, Chiapas specimens are nearly identical to isotypes I have seen of *D. hians,* and it has priority over *D. amplum*. Actually, the name *D. amplum* is questionably applicable to Chiapas collections on other grounds. The type of *D. amplum* is basically bipinnate, with the pinnules subentire to lobed one-third to one-half the pinnule width. Some of the type material looks rather like dissected forms of *D. striatum* except that the costae bear more numerous scales below, and the leaf tissue is glabrous. Chiapas collections are deeply bipinnate-pinnatifid. It is possible that the type of *D. amplum* is a somewhat juvenile specimen of *D. hians*.

6. **Diplazium lindbergii** (Mett.) Christ, Prim. Fl. Costar. 3:27. 1901.

—*Asplenium lindbergii* Mett., Ann. Sci. Nat. Bot. (5)2:236. 1864. —Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:707. 1977): Brazil, *Lindberg 543* (B).
Gymnogramme grande Bak., Syn. Fil. 377. 1868. —*Diplazium grande* (Bak.) C. Chr. Ind. Fil. Suppl. III, 74. 1934. —Syntypes: Colombia, *Holton 29, Linden 540* (isosyntypes P—4 sheets!); Ecuador, *Spruce 5286* (K).
Illustration: **Fig. 37.**

Rhizome presumably erect, stout; fronds mostly 1.3–2.0 m long, with stipe about half as long as blade; stipe 5–10 mm diam. at base, dark purplish brown throughout, persistently scaly at base, scales brownish, linear-lanceolate, mostly 1–2 cm long, twisted; blade pinnate-pinnatifid, without buds; pinnae equilateral, mostly 20–40 cm long, 3.5–5.5 cm broad, lowermost stalked 4–10 mm, basal segments of lower pinnae shortened; segments oblong, rounded to truncate at tip, with a serrulate margin, slightly oblique to patent, larger ones commonly 7–10 mm broad; veins to ca. 10(15) pairs per segment, lowermost pair from adjacent segments meeting margin at or just above sinus; leaf tissue thick-herbaceous to subcoriaceous, glabrous; costae below with a few tan, multicellular hairs at base of costules; indusia very narrow (<0.2 mm) and fugacious, or seemingly lacking.

In Montane Rain Forest, rarely Evergreen Cloud Forest; uncommon in the Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1200–2300 m. Southern Mex. (Ver.), Guat., Nic., C.R.; S.A. (Col., s Braz.). Chiapas Collections: *GM 127* (DS, P); *G 364* (K); *22651*; *23154*; *32264*; *32390*; *33642*; *34627*; *42510*.

A closely related and possibly conspecific species is *Diplazium induratum* Diels [nom. nov. for *Asplenium induratum* Christ, not Hook.], lectotype from Costa Rica (isolectotype of *Tonduz 9438* at P!). It differs in having somewhat more coriaceous blades, wider sinuses between segments, more revolute margins, and often broader pinnae.

7. **Diplazium lonchophyllum** Kunze, Linnaea 13:141. 1839.

—Type: Mexico, Veracruz, Jalapa, *Schiede s.n.* (isotype BM, photo US, UC!).

Diplazium inaequilaterum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:255. 1849. —Syntypes: Mexico, Veracruz, all collected by *Liebmann*, "Mirador," 1/43 [Liebm. Pl. Mex. 2379]; "circa Mirador," 7/41 [Liebm. Pl. Mex. 2379, Fl. Mex. 357]; "circa Mirador," 3/42 [Liebm. Pl. Mex. 2379, Fl. Mex. 355]; "Mirador," 7–11/41 [Liebm. Pl. Mex. 2379, Fl. Mex. s.n.]; "Baranca de Jovo," 5/41 [Liebm. Pl. Mex. 2380, Fl. Mex. 354, s.n.] (all C! photos UC! US!; isosyntypes K!—2 sheets, "Mirador"). All represent the same species.

Diplazium acutale Fée, Gen. Fil. 215. 1852. —Type: Mexico, *Galeotti 6289* (isotypes K! P!).

Illustration: none found.

Rhizome erect, ca. 1.5–2.0 cm diam.; fronds mostly (30) 50–100 cm long, with stipe mostly ca. ½–⅔ as long as blade, 2–3 mm diam., tan to stramineous, brownish-scaly at base; blade pinnate-pinnatifid; pinnae strongly inequilateral, basiscopic segments shorter and more oblique than acroscopic ones, only superior basal segments of lowermost pinnae nearly or quite free, others confluent at base; largest pinnae mostly 5–16 cm long, mostly 2–4 (6) cm broad; ultimate segments acutish, triangular to oblong, serrulate (especially toward tip); leaf tissue glabrous; indusia 0.5–0.7 mm wide, thin, tan, subentire; $n = 41$ (Oax.), 82 (Oax., Chis.).

Common along slopes and streams in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak Forest; Pacific Coastal Plain, n Sierra Madre, Northern and Eastern highlands; 180–1600 m. Southern Mex. (Jal., Méx., S.L.P., Ver., Mich., Oax.), Guat., Salv., Nic., C.R. Chiapas Collections: *GM 4*, pt. (DS); *P 10624*, pt. (UC); *22138*; *22461*; *25106*; *25231*; *30555*; *30686*; *30862*; *31233*; *31321*; *31428*; *32986*; *34494*.

8. **Diplazium neglectum** (Karst.) C. Chr., Ind. Fil. 236. 1905.

—*Asplenium neglectum* Karst., Fl. Columb. 1:106, pl. 52. 1860. —Type: Colombia, "Cordillerae Bogotensis," 2000 m, presumably *Karsten*.

Illustrations: see the original, which is not very typical of Chiapas specimens.

Similar to *Diplazium obscurum* but with lower pinnae to 5 cm broad, broadest at the truncate base, crenulate to shallowly lobed, lobes rounded to truncate, ca. 10 mm broad, up to 5 mm long; veins pinnate in lobes, each lobe with a midvein and 4–5 pairs of arcuate-ascending lateral veins, each of these lateral veins at least potentially fertile; blade apex pinnatifid or lobed for most of length.

In Montane Rain Forest; rare in s Sierra Madre; 1800 m. Southern Mex. (Chis. only), C.R.; S.A. (Col.). Chiapas Collections: *P 6861* (UC, US); *EM 3985* (MEXU, NY, US).

Closely related to *D. obscurum*, and it is possible that the two are only growth forms of the same species. Some incompletely developed specimens (e.g., *Matuda 3985*) have the venation, sori, and dissection of both species, i.e., the lower pinnae are like *D. neglectum* and the upper pinnae are like *D. obscurum*. Both species have scaly buds in the axils of the upper pinnae and have similar color, texture, and dark purplish-brown stipes.

9. **Diplazium obscurum** Christ, Bull. Herb. Boissier (2)7:269. 1907.

—Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:711. 1977): Costa Rica, Tablazo, *Biolley 60* (US, not found at P).

Diplazium flavescens (Mett.) Christ var. *proliferum* Christ, Bull. Herb. Boissier (2)5:729. 1905. —Type: Mexico, Chiapas, San Pablo, *Münch 166* (P! isotype DS! frag. US!).

Illustration: none found.

Rhizome erect or curved-ascending, caudex 2–3 cm diam., with very thick proplike roots 2–3 mm diam.; fronds mostly 1.0–1.6 m long, with stipe ⅓–½ blade length; stipe dark purplish brown, persistently scaly toward base, scales brownish, to ca. 1 cm long, 2 mm broad; blade pinnate with a terminal segment that is like the lateral ones but with 1–2 basal lobes, then shallowly crenate for a few cm; pinnae 9–10 pairs, oblong-elliptic, mostly 15–20 cm long, 3–4 cm broad, mostly entire but serrulate near apex, rounded-cuneate and stalked to 5 mm at base, acuminate at apex; veins free, forking 1–2 times at or near costa, midvein of each group then sometimes forking once more, all veins strongly upcurved and ultimately ± parallel, ca. 1 mm apart near margin of blade; distal pinnae viviparous in their axil; leaf tissue dark green, glabrous, thick, subcoriaceous; sori mostly confined to basal half of first acroscopic branch of each vein group, mostly diplazioid, to ca. 1 cm long; indusia brownish, narrow.

In Montane Rain Forest; locally common in the Northern Highlands (Jitotol Ridge), also n edge of Central Plateau; 1700–2000 m. Southern Mex. (Chis. only?), Nic., C.R.; S.A. (Col., Ven.). Chiapas Collections: *T&L 41742* (DS); *GM 166* (DS); *R 1057* (PH); *29817*; *32329*; *32621*; *35409*.

10. **Diplazium plantaginifolium** (L.) Urban, Symb. Antill. 4:31. 1903.

—*Asplenium plantaginifolium* L., Syst. Nat., ed. 10, 2:1323. 1759. —*Asplenium plantagineum* L., Sp. Pl. 2:1537. 1763 (nom. superfl.). —Type: "Brown. jam. 92. n. 2." In 1763, Linnaeus cited "Habitat in Jamaica, Brown. jam. 92." Proctor (Fl. L. Antill. 2:261. 1977) cited *P. Browne*, from Jamaica, as type.

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 27. 1909; Vareschi, Fl. Venez 1(2):pl. 84, fig. 1. 1969; Proctor, Fl. L. Antill. 2:259. 1977.

Rhizome erect or curved-ascending, caudex to ca. 6 cm long, 1–2 cm diam., with numerous thick (1–1.5 mm) wiry roots; fronds caespitose, erect, mostly 30–70 cm long, 4–6 (7) cm broad, brownish stipe usually slightly longer than blade, ca. 1.5–2.0 mm diam.; blade simple, oblong-lanceolate, broadly cuneate or roundish-truncate at base, often viviparous at base, margin subentire to usually serrate, especially distally; veins free, oblique to costae, forking at base and then up to 4 more times, the branches curved and ultimately ± parallel, ca. 1 mm apart at blade margin; leaf tissue chartaceous-herbaceous, dark green above, glabrous; sori up to 3 cm long, often only the first acroscopic vein branch with diplazioid sori, shorter sori mostly single; indusia very narrow, membranous, brownish.

Along stream banks in Lower Montane and Montane rain forests; widely scattered in Northern and Eastern highlands, edges of Central Plateau, s Sierra Madre and Pacific Coastal Plain; 450–1300 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Bol., s Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *GM s.n.* (UC); *GM 6* (DS, US); *Dr 1620* (MEXU, NY, US); *R 823* (NY, PH); *G 441* (K, NY, PH); *EM 222, 889* (MEXU); *26289*; *30815*; *31507*; *31592*; *32216*; *32979*; *38037*.

Ghiesbreght 441 at NY has the blades lobed at the base, thus tending towards *D. vera-pax.*

11. Diplazium prominulum Maxon, Contr. U.S. Natl. Herb. 13:15. 1909.

—TYPE: Guatemala, Baja Verapaz, between Purulhá and Panzál, *v. Tuerckheim II 1683* (US; isotype P!).

ILLUSTRATION: none found.

Similar to *D. cristatum* and *D. lonchophyllum*, differing from both in its stout, yellowish, flexuose rachis, prominent veins below, leaf tissue subcoriaceous, pinnae simply acute (not elongate or caudate at tip), segments broadly ovate-triangular, soriferous throughout the segments, sori placed close together, rhizome erect, with a ± naked apex.

In Evergreen Cloud Forest; rare in Central Plateau; 2300 m. Southern Mex. (Chis. only ?), Guat., Nic., C.R. CHIAPAS COLLECTION: *33658*.

Very closely related to *D. lonchophyllum*; possibly not distinct. However, in Chiapas, it grows at higher elevation than *D. lonchophyllum*.

12. Diplazium striatum (L.) Presl, Tent. Pterid. 114. 1836.

—*Asplenium striatum* L., Sp. Pl. 2:1082. 1753. —TYPE: Petiver's Pter. Amer. pl. 3, figs. 3, 4 (1712), which was copied from Plumier's Tract. Fil. Amer. pls. 18, 19 (1705), based on a collection from Martinique; LINN 1250.21 is not this species, but *Diplazium cristatum* (Desrouss.) Alston, and was probably added to LINN after 1755 (Jackson, 1912).

Diplazium crenulatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:254. 1849. —SYNTYPES: Mexico. Veracruz. "Baranca de Jovo," *Liebmann* [Liebm. Pl. Mex. 2382, Fl. Mex. 358, 787]; "Hac. de Mirador," *Liebmann* [Liebm. Pl. Mex. 2665, Fl. Mex. 789]; "inter Colipa et Misantla," *Liebmann* [Liebm. Pl. Mex. 2383, Fl. Mex. 360, 788] (all C!, 787–789 in folio herb.; isosyntypes K! labelled "Misantla." Lellinger (Proc. Biol. Soc. Wash. 89:710. 1977) chose "between Colipa and Misantla," *Liebmann* (US) as lectotype.

Diplazium elongatum Fée, Gen. Fil. 215. 1852. —TYPE: Mexico, Oaxaca, Petlapa, *Galeotti 6471* (P! photo US, UC!).

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 82. 1969.

Rhizome stout, erect; fronds mostly 0.7–1.6 m long, stipe ca. $^{1}/_{2}$–$^{3}/_{5}$ blade length; stipe 4–7 mm diam., brownish at base, tan to stramineous distally, bearing persistent ovate scales ca. 10 mm long, 4 mm broad at base; blade pinnate-pinnatifid, infrequently bipinnate-pinnatifid at base, pinnae gradually shortened to the confluent, pinnatifid apex; pinnae ca. 20 pairs, equilateral, largest stalked to ca. 10 mm, truncate or subcordate at base, acuminate at apex, mostly (12) 15–30 cm long, 3–6 (8) cm broad, patent, deeply pinnatifid throughout or lower pinnae bipinnate, if bipinnate then pinnules usually adnate, crenate or very shallowly lobed; segments oblong, 6–12 (15) mm broad at base, rounded or truncate at apex, the margins serrulate, basal ones of lower pinnae sometimes distant, reduced, constricted at base; veins pinnate in segments, simple to 1–2-forked, ca. 8–12 pairs; leaf tissue chartaceous to thick-herbaceous, glabrous, or in ours, usually with numerous, short (0.2–0.3 mm long), acicular, erect hairs on costa, leaf tissue, and veins below; sori straight to slightly curved, mostly 2–6 mm long; indusia thin, brownish, ca. 0.4 mm wide, erose to ± entire; n = 164 (Jam.), ca. 164 (Ver.).

In Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, rare in Evergreen Cloud Forest; relatively common in the Sierra Madre, Northern Highlands, s Pacific Coastal Plain; 150–1700 (2000) m. Southern Mex. (Oax., Ver., Tab.), Salv., Nic., C.R.; S.A. (Col. to Bol., s Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *GM 169* (DS)?; *R 821* (NY, PH); *P 6736* (UC, US); *EM 18164* (DS, MEXU, US); *F 35394* (NY); *GM 77* (DS); *25063*; *31343*; *31489*; *31600*; *32614*; *32738*; *38031*; *42626*.

Occasional specimens are fully bipinnate-pinnatifid (e.g., *GM 169*). It is possible that these specimens represent another species.

13. Diplazium ternatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:252. 1849.

—*Asplenium ternatum* (Liebm.) Hook., Sp. Fil. 3:265. 1860 (not Presl, 1825). —TYPE: Mexico, Oaxaca, Villa Alta, "inter Tonaguia et Roayaga," *Liebmann* [Liebm. Pl. Mex. 2385, Fl. Mex. 362, 363, 364] (C! isotypes K! P!). I choose Fl. Mex. 364 as lectotype.

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 28. 1909; Hooker, Second Cent. Ferns pl. 51. 1860.

Rhizome suberect to erect, caudex short, 1–2 cm diam.; fronds few, arching, 20–40 cm long, with stipe slightly exceeding blade length, ca. 1.5 mm diam.; blade ternate, with a single pair of lateral pinnae and a conform terminal pinna, terminal pinna often slightly larger, to 15 cm long, 2.5–4 cm broad, the lateral upcurved, broadly cuneate at base, acuminate at apex, viviparous in axil, crenate-serrate along margin; veins free (or occasionally anastomosing to form elliptic areoles), branched up to 6 times, branches up-curved and ultimately ± parallel, ca. 1 mm apart at blade margin; leaf tissue chartaceous to subcoriaceous, dark green above, glabrous; sori to ca. 2 cm long, usually only the first acroscopic vein branch with diplazioid sori; indusia very narrow, brownish; n = 82 (Oax., Hond.).

Terrestrial or often on wet, mossy rocks in Montane Rain Forest; rare in Northern Highlands, cen. Sierra Madre; 800–2100 m. Southern Mex. (Oax.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *R 1048* (PH); *32387*; *34378*.

14. Diplazium urticifolium Christ *in* Pittier, Prim. Fl. Costar. 3:29. 1901.

—TYPE: Costa Rica, "Vallée de Tuís," *Pittier 11293* (P? not found, or perhaps BR).

ILLUSTRATION: none found.

Rhizome erect; fronds caespitose, 65–130 cm long, with stipe ca. 2/5 as long as blade, tan, at base with brownish, twisted scales to 1 cm long, 1.5 mm wide; blade deltoid-lanceolate, with 9–17 pairs of lateral pinnae, uppermost pair abruptly reduced and giving rise to a terminal subhastate pinnatifid segment; largest pinnae equilateral, to 18 cm long, 3 cm broad, stalked 3–10 mm, truncate at base, crenately incised or very shallowly lobed along margin, lobes truncate or rounded, broader than long (ca. 5–9 mm wide, 1–2 mm long); veins free, pinnate from costules, 3–4 (6) pairs per segment; leaf tissue glabrous, thick-herbaceous; sori single or diplazioid along ultimate veins, to ca. 6 mm long; indusia ca. 0.3 mm wide, brownish, subentire.

In Montane Rain Forest; rare in Northern Highlands (Jitotol Ridge), SE corner of Central Plateau; 1300–1700 m. Southern Mex. (Oax.), Bel., Nic., C.R. CHIAPAS COLLECTIONS: *32184*; *32629*.

15. Diplazium vera-pax (Donn.-Smith) Hieron., Hedwigia 59:322. 1917.

—*Asplenium vera-pax* Donn.-Smith, Bot. Gaz. (Crawfordsville) 13:77, pl. 2. 1888. —TYPE: Guatemala, Alta Verapaz, Pansamalá, *v. Tuerckheim s.n.* [ed. Donn.-Smith 850] (US; isotypes K—2 sheets!, P—2 sheets!).

Asplenium cordovense Baker, Ann. Bot. 8:125. 1894. —*Diplazium cordovense* (Baker) C. Chr., Ind. Fil. 230. 1905. —TYPE: Mexico, Veracruz, near Cordova, *Finck* [*143*] (K! UC!). See Maxon, Proc. Biol. Soc. Wash. 46:142. 1933.

ILLUSTRATION: only the original.

Rhizome erect; fronds few, arching, 50–85 cm long, with stipe usually about as long as blade, greenish brown, ca. 2 mm diam.; blade pinnate below with 1–4 (8) pairs of free, sometimes short-stalked pinnae followed by up to 5 pairs of adnate pinnae and a long (15–25 cm) pinnatifid apex; lowermost pinnae to ca. 12 cm long, 2.5 cm broad, broadly cuneate at base, viviparous in axil, subentire to crenate-serrate along margin, acute to acuminate at tip; veins free, forking 1–3 times, branches upcurved and ultimately ± parallel, ca. 1 mm apart at blade margin; leaf tissue thick-herbaceous to chartaceous, dark green above, glabrous; sori to 2 cm long, usually only the first acroscopic branch fertile or at least the only branch bearing diplazioid sori; indusium very narrow, brownish.

Montane Rain Forest; rare in Eastern Highlands; 800 m. Southern Mex. (Ver.), Guat., Nic., Pan. CHIAPAS COLLECTION: *33110*.

This species is questionably distinct from *Diplazium riedelianum* (Bongard ex Kuhn) Kuhn ex C. Chr., type from Brazil. Both species have lower pinnae with buds in the axils. The only difference between them that I can find is that the lower pinnae in *D. riedelianum* tend to be somewhat more elongate and acute at the tip.

16. Diplazium werckleanum Christ, Bull. Herb. Boissier (2)4:969. 1904.

—TYPE: Costa Rica, *Wercklé 81* (presumably P, not found).

ILLUSTRATION: none found.

Rhizome erect to occasionally suberect, caudex ca. 1.5–2.0 cm diam. to ca. 8 cm long; fronds mostly 30–75 (100) cm long, with stipe ± equaling blade; stipe brownish and scaly at base, tan to stramineous and glabrous distally, 1–4 mm diam.; blade pinnate, deltoid, broadest at base, gradually tapering toward an acutely lobed, deltoid tip, apex attenuate and serrate; pinnae 4–10 pairs, inequilateral, excised below, usually with an obtuse auricle above; largest pinnae stalked to 5 mm, to 12 cm long, 1.5–2.5 cm broad, upcurved, acute to attenuate at tip, subentire to serrate to shallowly lobed along margin, if lobed, then lobes broader than long, rounded to occasionally acute, serrulate; viviparous buds absent or sometimes present in axil of distal pinna; veins forking up to 4 times, branches ascending, in more deeply lobed specimens the main lateral veins from costae with up to 3.5 pairs of pinnate veins; leaf tissue thick, subcoriaceous, dark bluish green above, glabrous; sori curved, to ca. 1 cm long, often confined to first acroscopic branch of a vein group, less often other branches also fertile; indusia brownish, $n = 82$ (Oax.).

In Montane Rain Forest, Pine-Oak-Liquidambar Forest, less often Evergreen Cloud Forest; locally common in the Central Plateau and Sierra Madre, rare in Eastern Highlands, not known from Northern Highlands; (800) 1200–2700 m. Southern Mex. (Ver., Oax.), Hond., Salv., Nic., C.R., Pan.; S.A. (Col.). CHIAPAS COLLECTIONS: *P 7108* (UC); *P 7252* (NY, UC, US); *7253* (UC, US); *P 10624*, pt. (UC); *MC 1869* (US); *GM 138* (DS); *21151*; *22304*; *22332*; *22376*; *22598-A*; *22599*; *24920*; *26757*; *26827*; *29666*; *31309*; *31997*; *32271*; *33001*; *33664*; *33672*; *34625*; *34693*; *34834*; *35217*; *38929*; *41091*; *41096*; *42563*.

Those collections that have the lower pinnae lobed to the middle are also generally the most fertile, e.g., *21151*, *22332*, *26757*, *26827*, and *33672*. Two of these (*22332* and *26757*) seem to have abortive or partially abortive spores and may represent hybrids. All five of these collections match fairly well *D. tablazianum* Christ, syntypes from Costa Rica. If both species are "good," then I believe that both occur in Chiapas; however, I am not at all sure that two entities can or should be recognized.

Diplazium werckleanum appears most closely related to *D. cristatum* and *D. lonchophyllum*, both occurring in Chiapas. It may occasionally grow with *D. cristatum*, but apparently not with *D. lonchophyllum*, which is at lower elevations.

EXCLUDED SPECIES

Diplazium falcatum Liebm. —The type is from Mexico, Oaxaca, Chinantla, Teotalcingo, *Liebmann* [Liebm. Pl. Mex. 2375, Fl. Mex. 361] (C!). Maxon, in 1929, annotated this specimen as "young *Hemitelia* sp." I agree that it is Cyatheaceae but cannot say what species it might be.

Diplazium villosum (Presl) Presl —The type is from Mexico, *Haenke s.n.* (probable isotype K, ex herb. Forbes Young!; also BM, photo P!). This is certainly not *Diplazium*; most likely it is juvenile Cyatheaceae.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Diplazium grandifolium (Swartz) Swartz —Bel., Nic., C.R.; S.A. (Col., Ecu.); Gr. Antill., Trin. Similar only to *D. obscurum* and *D. urticifolium* in our area, differing from those species in pinnae truncate or subcordate at their base (not rounded), usually without buds, often slightly auriculate at the superior base.

37. DIPLOPTERYGIUM

Diplopterygium (Diels) Nakai, Bull. Natl. Sci. Mus. 29:47. 1950. —*Gleichenia* subg. *Mertensia* sect. *Diplopterygium* Diels *in* Engler & Prantl, Nat. Pflanzenfam. 1(4):353, fig. 188A. 1900. —*Gleichenia* subg. *Diplopterygium* (Diels) Holttum, Reinwardtia 4:261. 1957. —Lectotype (chosen by Christensen, Ind. Fil. liv. 1906): *Gleichenia glauca* (Thunb. ex Houtt.) Hook. [≡*Polypodium glaucum* Thunb. ex Houtt.] ≡*Diplopterygium glaucum* (Thunb. ex Houtt.) Nakai.

Rhizome long-creeping, with deciduous lanceolate scales; fronds pseudodichotomous at top of stipe, apex an aborted scaly bud, infrequently developed; pinnae two, opposite, large, pinnate-pinnatisect to bipinnate; veins 1-forked; sori of 2–4 (5) sporangia; $x = 56$.

As discussed by Pichi Sermolli (Webbia 26:491–536. 1972), *Hicriopteris* has been incorrectly applied to species of *Diplopterygium* by Copeland (1947) and others. *Diplopterygium* can be treated either as a genus or as a subgenus of *Gleichenia* (Holttum, 1957). Recent cytological studies have shown disparate chromosome numbers within *Gleichenia* s.l. (Walker, Trans. Roy. Soc. Edinburgh 66:169–237. 1966), and primarily for this reason, I maintain *Diplopterygium* as a genus. It consists of about 10 species, distributed from India, Southeast Asia, and Japan through Malesia, with a single species in the American Tropics.

References: Holttum, R. E. 1957. Morphology, growth-habit, and classification in the family Gleicheniaceae. Phytomorphology 7:168–184; Maxon, W. R. 1909. Gleicheniaceae. *In* North American Flora 16(1):53–63.

1. Diplopterygium bancroftii (Hook.) A. R. Smith, Amer. Fern J. 70:26. 1980.

—*Gleichenia bancroftii* Hook., Sp. Fil. 1:5, pl. 4A. 1844. —*Mertensia bancroftii* (Hook.) Kunze, Linnaea 18:307. 1844. —*Dicranopteris bancroftii* (Hook.) Underw., Bull. Torrey Bot. Club 34:252. 1907. —*Hicriopteris bancroftii* (Hook.) Ching, Sunyatsenia 5:278. 1940. —Syntypes: Jamaica, both *Swartz* and *Bancroft* collections cited, but perhaps Hooker saw only the latter (*Bancroft s.n.* K! isosyntype BM!).

Illustrations: **Fig. 38**; Plumier, Tract. Fil. Amer. pl. 25. 1705; Stolze, Fieldiana, Bot. 39:47. 1976.

Rhizome to 6 mm diam., muricate, sparingly covered with brownish to light-castaneous lanceolate scales to 7 mm long, glabrescent; stipe stout, ca. 5 mm diam., stramineous, naked, or base brownish and somewhat scaly, bearing a pair of large bipinnate pinnae, axial growth sometimes continued from included bud, a second and third pair of pinnae thus produced in acropetal succession; terminal bud large, to 2 cm long, densely clothed with whitish to dull yellowish, ovate to deltoid-lanceolate, entire, long-acuminate scales; pinnae determinate, 1–1.5 m long, 30–50 cm broad, costa stout, glabrous, to 4 mm diam., delicately bicarinate above; pinnules very numerous, inserted ca. 2–3 cm apart, approximate or slightly imbricate, divergent, sessile, linear, 15–25 cm long, 3–4.5 cm broad, cut to costa; costae stramineous, with a few deciduous, slender, deeply laciniate or filiform, yellowish scales; segments chartaceous, very brittle, numerous, linear-ligulate, 1.5–2.3 cm long, ca. 2.5 mm broad, mostly adnate and decurrent, glabrous or nearly so, glaucous or green below, costule conspicuously elevated, stramineous, glabrescent; veins 1-forked near base, branches widely divergent; sori inframedial on anterior branch, 3–5-sporangiate, a tuft of filiform yellowish scales beneath; $n = 56$ (Jam., Oax.).

Edges of Montane Rain Forest, rare in Evergreen Cloud Forest, sometimes scrambling over shrubs and small trees; uncommon in Northern Highlands (Jitotol Ridge), s Sierra Madre; 1700–2200 m. Southern Mex. (Oax., Ver.), Guat., Salv., Hond., Nic., C.R.; S.A. (Ven. and Col. to Bol.); Antill. Chiapas Collections: *P 6719* (UC, US); *EM 15391* (MEXU, US); *G 432* (YU); *23118*; *23220*; *31645*; *31938*; *32393*; *32657*; *42680*.

38. DORYOPTERIS

Doryopteris J. Smith, J. Bot. (Hooker) 4:162. 1841. —Lectotype (chosen by Morton, Amer. Fern J. 34:26. 1944): *Pteris palmata* Willd. [≡*Doryopteris palmata* (Willd.) J. Smith] ≡*Doryopteris pedata* (L.) Fée var. *palmata* (Willd.) Hicken.

Plants terrestrial; stipe usually sclerotic, black or atropurpureous, with 1–2 vascular bundles (if one, then terete to U- or V-shaped); stipe base and rhizome scales bicolorous, with a dark central band and stramineous margins; blade usually pedately divided (entire, trilobate or sagittate in a few species), deltoid, with basiscopic segment of lowermost pinnae often prolonged; blade chartaceous to coriaceous, glabrous; venation areolate or free, not easily visible; sori marginal, usually continuous, with indusia formed by reflexed modified segment margin; vascular commissure often connecting vein tips; sporangia usually long-stalked (stalk 1–3 times capsule); spores tetrahedral-globose, frequently with a cristate sporoderm; $x = 30$.

About 30 species, most of them occurring in Brazil (especially southern Brazil). One species (*D. concolor*) is pantropical, and perhaps five species are endemic to Madagascar. According to Tryon, the affinities of *D. concolor* and the Old World species ascribed to *Doryopteris* are problematical. Only two species have ranges into North America; both occur in Mexico. *Doryopteris* is a genus of rather dry rocky places.

Reference: Tryon, R. M. 1942. A revision of the genus *Doryopteris*. Contr. Gray Herb. 143:1–80.

Venation free; proliferous buds absent .... 1. *D. concolor*
Venation areolate; proliferous buds present at base of blade .... 2. *D. pedata* var. *palmata*

1. **Doryopteris concolor** (Langsd. & Fisch.) Kuhn *in* v. d. Decken, Reisen in Ost-Afrika 3(3):19. 1879.

—*Pteris concolor* Langsd. & Fisch., Icon. Fil. 19, pl. 21. 1810. —Type: "Archipelagi Marquesas dicti insula Nucahiva," *Langsdorf* (isotypes BM! B—Herb. Willd. 19961).

Illustration: Tryon (1942:53).

Rhizome short, compact; stipe reddish brown to black, glabrous or glabrescent, usually wing-angled or sulcate on adaxial side; fertile and sterile blades similar in outline, without proliferous buds; sterile fronds 4–15 cm long, with blade 2–5 cm long, pentagonal, bi- to tripinnatifid; fertile fronds 5–34 cm long, with blade 3–15 cm long; venation free, veins ending in hydathodes on upper surface; soral lines usually broken by sinuses; $n = 60$ (Taiwan).

Not yet known from Chiapas, but to be expected. Southern Mex. (Oax., Ver.), Guat., Hond., Salv.; S.A. (Ven., Parag., Urug., n Arg.); Antill.; Afr., Asia, Austral., Pacific Basin.

2. **Doryopteris pedata** (L.) Fée var. **palmata** (Willd.) Hicken, Revista Mus. La Plata 15:253. 1908.

—*Pteris palmata* Willd., L. Sp. Pl., ed. 4, 5:357. 1810. —*Doryopteris palmata* (Willd.) J. Smith, J. Bot. (Hooker) 4:163. 1841. —Type: Venezuela, Caracas, *Bredemeyer* (B—Herb. Willd. 19957; photo US).

Illustrations: Tryon (1942:44); Rovirosa, Pterid. Sur Mex. pl. 19. 1909; Proctor, Fl. L. Antill. 2:175. 1977 (var. *pedata*).

Rhizome short, compact; stipe usually short-pubescent (especially distally and on upper side), plane on upper side; fertile and sterile blades subdimorphic, with proliferous buds at their base; sterile fronds 2.5–37 cm long, with blade 1.5–14 cm long, deltoid, shallowly 3-lobed in small blades to pentagonal and rather deeply 5-lobed in larger blades, the largest tripinnatifid; fertile fronds 11–40 cm long, with blade 4–15 cm long, usually pentagonal, ultimate segments narrower than in sterile blade; veins areolate, ending in submarginal hydathodes on upper surface; $n = 60$ (Gal.).

Rare, Northern Highlands; 1400 m. Southern Mex. (Gro., Oax., Ver.), Guat., Nic., C.R.; S.A. (Ven., Bol., Gal.). The sole Chiapas record is based on a literature citation by Rovirosa (Pterid. Sur Mex. 142, 1909), *Rovirosa 1084*, "montañas basálticas del Relicario, el Sacramento y el Rosario." I have been unable to locate this specimen at PH, NY, or K.

Additional varieties of *D. pedata* occur in the West Indies (var. *pedata*) and South America (var. *multipartita*).

39. DRYOPTERIS

Dryopteris Adanson, Fam. des Pl. 2:20. 1763 (nom. cons.). —Type: *Dryopteris filix-mas* (L.) Schott [≡*Polypodium filix-mas* L.].

Rhizome usually short, stout, erect or suberect, scaly; rhizome and stipe base scales ovate, glabrous, entire or toothed, not ciliate, with long narrow cells and flexuous cell walls; fronds erect to arching, mostly evergreen; stipe stout, usually shorter than blade, often scaly, with numerous vascular bundles arranged in a ring (cross section); blade anadromous at base, pinnate to pinnate-pinnatifid to often tripinnate or more dissected; ultimate segments usually toothed or spinulose, not ciliate, sometimes glandular, sparingly to densely scaly; minor axes decurrent on major ones, forming sides of adaxial grooves that run into grooves of the next order; veins free, simple or mostly forked, ending short of margin in a clavate tip (seen from above); sori dorsal on veins, round; indusia orbicular-reniform to reniform, often large, persistent, glabrous, sometimes glandular; spores bilateral, monolete, with a perispore; gametophytes cordate, green; $x = 41$.

Nearly cosmopolitan, but with the greatest number of species occurring in north temperate regions; in the tropics the species tend to be found at high elevations. The number of species in *Dryopteris* is difficult to estimate because of the variety of circumscriptions it has received, but there are perhaps 100 species, with 25 in the New World. The greatest number of species is in eastern Asia and the Himalayan region.

Reference: Christensen, C. 1913. A monograph of the genus *Dryopteris*. Part I. The tropical American pinnatifid-bipinnatifid species. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:55–282.

a. Blade pinnate-pinnatifid; stipe and rachis densely and persistently scaly; 1900–2900 m .... 5. *D. parallelogramma*
aa. Blade bipinnate to 3-pinnate-pinnatifid; stipe and rachis glabrous to sparingly scaly.
  b. Leaf tissue on both sides and indusia covered with numerous, conspicuous, cylindrical, yellowish or whitish glands; indusia coriaceous, hemispherical; below 1000 m .... 2. *D. karwinskyana*
  bb. Leaf tissue glabrous or with minute inconspicuous capitate glands; indusia flattened, thin.
    c. Blade deltoid, tripinnate-pinnatifid; lowermost pinnae strongly basiscopically developed, deltoid; 2700–3000 m.
      d. Stipe castaneous toward base; pinnae ± perpendicular to rachis; sori submarginal, often confined to apex of segments .... 4. *D. nubigena*
      dd. Stipe stramineous toward base; pinnae strongly ascending; sori ± medial, at base of ultimate segments .... 1. *D. futura*
    cc. Blade ovate-lanceolate to narrowly deltoid, bipinnate-pinnatifid to tripinnate; lowermost pinnae equilateral or slightly basiscopically developed; low to high elevations.

e. Stipe base and rhizome scales reddish tan, to 2.5 cm long; stipe stramineous to brownish; lower and medial pinnae often strongly ascending; 200–2400 m . . . . 6. *D. patula*

ee. Stipe base and rhizome scales tan with darker heavy streaks; stipe tan to atropurpureous; lower and medial pinnae perpendicular to somewhat ascending; 2000–2700 m . . . . 3. *D. munchii*

1. **Dryopteris futura** A. R. Smith, Proc. Calif. Acad. Sci. (4) 40:216, fig. 3, F–I. 1975.

—TYPE: Mexico, Chiapas, Munic. El Porvenir, 3–4 km w of El Porvenir along road from Huixtla to Siltepec, *Breedlove 31772* (*with Smith*) (DS!).

ILLUSTRATION: only the original.

Stipe to 70 cm long, 5 mm diam., toward the base densely scaly, scales ovate-lanceolate, to 2.5 cm long, 5 mm wide, entire, brown (upwards tan), concolorous, somewhat lustrous, rachis stramineous, glabrous or sparsely stipitate-glandular; blade at base tripinnate-pinnatifid to 4-pinnate-pinnatifid, to 40 cm long, 35 cm wide, deltoid; pinnae ca. 12 pairs, ascending at an angle of 45–60° from rachis, lowermost deltoid, opposite to subopposite, to 25 cm long, 17 cm wide, stalked to 1.5 cm, basiscopically developed; secondary pinnae subopposite to alternate, lanceolate, slightly basiscopic to nearly equilateral, lowermost stalked to 5 mm; pinnules to 12 pairs, bipinnate to deeply pinnatifid, ultimate segments denticulate; leaf tissue thin, without scales, on both sides glabrous or below stipitate-glandular (especially the axils); indusia orbicular-reniform, ca. 1 mm diam., tan, at the margin stipitate-glandular; $n = 41$ (Chis.).

In Evergreen Cloud Forest; rare in Central Plateau (Cerro Huitepec) and s Sierra Madre; 2600–2800 m. Elsewhere known from Edo. Méx. [*Hinton 3447* (K) and *3469* (BM, K)] and Guat. (Stolze, in litt.). CHIAPAS COLLECTIONS: *31772* (type); *32058*; *42786*.

2. **Dryopteris karwinskyana** (Mett.) O. Ktze., Rev. Gen. Pl. 2:813. 1891.

—*Aspidium karwinskyanum* Mett., Abh. Senckenberg. Naturf. Ges. 2:343. 1858. —TYPE: Mexico, *Karwinsky s.n.* (presumably B).

ILLUSTRATION: Matuda, Anales Inst. Biol. Univ. Nac. México 27:129. 1956.

Rhizome short-creeping; fronds mostly 50–100 cm long, to ca. 30 cm broad; stipe tan at base, densely clothed with linear-lanceolate, light-castaneous scales, becoming sparingly scaly and stramineous distally; rachis stramineous, sparsely scaly, glandular-hairy; blade 3-pinnate-pinnatifid below, becoming 2-pinnate-pinnatifid distally, lowermost pinnae largest, ascending, basiscopically developed; pinnae to ca. 13 pairs, gradually shortened distally, lowermost deltoid, to 20 cm long, 9 cm wide; veins simple to 1-forked; leaf tissue thin, light green, on both sides with yellowish or whitish, unicellular, cylindrical, glandular hairs 0.1–0.2 mm long; indusia very large (to 1.5 mm diam.), vaulted (hemispherical), coriaceous, reniform-orbicular, covered with glands as on leaf tissue; $n = 41$ (Oax.).

Known in our area by four collections at the western edge of the Central Depression (road from Tuxtla Gutiérrez to Nuevo Concordia) and where this adjoins the Sierra Madre; uncommon in Seasonal Evergreen Forest, Montane Rain Forest, along streams, slopes with *Quercus*; 750–1300 m (throughout range usually below 1000 m). Western and s Mex. (Sin., Nay., Gro., Méx., Oax.), Guat., Hond., Nic., Salv., C.R. CHIAPAS COLLECTIONS: *37788*; *38468*; *40121*; *40670*.

3. **Dryopteris munchii** A. R. Smith. Proc. Calif. Acad. Sci. (4)40:218, fig. 3, A–B. 1975.

—TYPE: Mexico, Chiapas, Baduitz, *Münch 116* (DS! isotype US!).

ILLUSTRATION: only the original.

Rhizome erect to suberect; stipe to 35 cm long, 5 mm diam., brown, scaly at base, scales ovate-lanceolate to lanceolate, to 10 mm long, 1 (2) mm wide, not shiny, often bicolorous, apex tan, entire, toward the base blackened or dark-streaked, dentate; rachis tan, eglandulose, epilose, with scattered (rarely numerous) scales; blade at base subtripinnate, upwards 2-pinnate-pinnatifid, to 50 cm long, 20–28 cm broad, gradually tapering distally; pinnae ca. 16 pairs, the basal subopposite, spreading, slightly or not at all shortened, deltoid-lanceolate, to 15 cm long, 8.5 cm wide, stalked up to 6 mm, basiscopically developed, distal pinnae alternate, lanceolate, sessile to short-stalked ca. 1 mm, ± equilateral; pinnules to ca. 10 pairs, spinulose at apex; leaf tissue chartaceous, dark green above, lighter green below, bearing minute, tan, ovate to linear scales along costae and costules below, otherwise glabrous, eglandulose; indusia orbicular-reniform, ca. 0.8–1.0 mm diam., reddish brown, glabrous.

Known from only three collections from Evergreen Cloud Forest; Central Plateau; 2000–2700 m; endemic. CHIAPAS COLLECTIONS: *GM 116* (type); *GM 167* (DS); *22027*.

4. **Dryopteris nubigena** Maxon & Morton, Proc. Biol. Soc. Wash. 50:179. 1937.

—TYPE: Guatemala, Dept. Chimaltenango, Buena Vista above Tecpán, ca. 3000 m, *Skutch 771* (US; isotype US!).

ILLUSTRATION: **Fig. 39.**

Rhizome erect, densely scaly, scales ovate to lanceolate, 8–15 mm long, 1–3 mm broad, castaneous, lustrous, minutely glandular-denticulate; fronds (15) 50–85 cm long, stipe equaling or mostly slightly longer than blade, 1–3 mm diam., castaneous and scaly in basal portion, scales similar to those of rhizome; blade deltoid, 7–42 cm long, 5–44 cm broad, 3-pinnate to 3-pinnate-pinnatifid; rachis stramineous, glabrous or very sparsely capitate-glandular; pinnae 5–12 pairs, opposite to subopposite, ± perpendicular to rachis, the lowest basiscopically developed, deltoid, to 22 cm long, 13 cm broad, stalked to 1.5 cm, distal pinnae narrower, nearly equilateral; pinnules up to 15 pairs, basal ones free, to 4.5 cm long, 2 cm broad; tertiary pinnules subopposite, up to 9 pairs, larger ones ca. 1 cm long, 5 mm broad, deeply pinnatifid, ultimate segments with 2–4 teeth; costae and costules bearing stalked capitate glands and a few appressed hairlike scales; leaf tissue membranous, bearing scattered minute glands; sori solitary on ultimate segments; indusia orbicular-reniform, small, tan, glandular on margin.

Known in Chiapas from essentially two localities in Evergreen Cloud Forest; rare in Central Plateau (Zontehuitz) and Sierra Madre (Cerro Mozotal); 2800–3000 m. Southern Mex. (Oax.), Guat. CHIAPAS COLLECTIONS: *22069*; *22721*; *22818*; *22933*; *40334*; *41739*.

Plants much smaller than the type (e.g., *22069*, *22818*) occur in Chiapas, but do not otherwise differ. The species does not seem at all close to *D. karwinskyana* with which it was compared by Maxon and Morton; rather it seems related to *D. munchii* and *D. futura*.

5. **Dryopteris parallelogramma** (Kunze) Alston, Amer. Fern J. 47:92. 1957.

—*Aspidium parallelogrammum* Kunze, Linnaea 13:146. 1839. —*Dichasium parallelogrammum* (Kunze) Fée, Gen. Fil. 302, pl. 23B, fig. 1. 1852. —Type: Mexico, *Karwinsky s.n.* (B).

Aspidium paleaceum Swartz, Syn. Fil. 52. 1806. —*Dryopteris paleacea* (Swartz) C. Chr., Amer. Fern J. 1:94. 1911 (not Hand.-Mazz., 1908). —Type: Peru, *Lagasca s.n.*

Aspidium crinitum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):66, pl. 17, fig. 2. 1842. —Type: Mexico, Oaxaca, Llano-Verde, *Galeotti 6348* (BR! isotypes B, BR—6 sheets!, K! P).

Illustrations: see those cited above; also Knobloch & Correll, Ferns Chih. 174. 1962.

Rhizome scales dark brown, ovate-lanceolate to linear-lanceolate, filiform at apex, with subentire to remotely serrulate margin, to 2 cm long; fronds to 135 cm long; stipe short, mostly 15–30 cm long, tan, almost concealed by spreading scales that are similar to those of rhizome; blade deeply pinnate-pinnatifid to nearly bipinnate, lower several pinna pairs slightly shortened, oblong-lanceolate; rachis stramineous, with copious dark brown hairlike scales; pinnae linear-lanceolate, acuminate, sometimes attenuate, to 15 (18) cm long, 2.5 (3.0) cm wide; segments oblong to oblong-quadrate, truncate to broadly rounded at apex, entire to serrulate, especially at apex, strictly parallel to one another and slightly oblique; veins simple to 1 (2)-forked; leaf tissue deep green and shiny above, lighter green below, glabrous; sori medial; indusia reddish brown, orbicular-reniform, glabrous; 18 II + 87 I at meiosis (Edo. Méx.); *n* = 82 (Oax., Jam.).

In Evergreen Cloud Forest, less often Montane Rain Forest, Pine-Oak Forest; common on higher peaks of Central Plateau, also s Sierra Madre; 1900–2900 m. Nearly throughout Mex. (Chih., Tam., Hgo., Méx., D.F., Mlos., Gro., Jal., Mich., Oax., Pue., Ver.) to nw Arg. and s Braz.; Jam., Hisp. I have seen specimens from Hawaii, New Guinea, and the Himalayas that are indistinguishable from American collections. Chiapas Collections: *L&S 9849* (UC, US); *C&D 136* (US); *GM 43* (DS); *G 213* (K, NY, PH); *JTM 1244* (US); *EM 5267* (MEXU, US); *MC 1583* (US); *Ton 96* (DS); *6658*; *8154*; *14156*; *15265*; *21997*; *22074*; *22645*; *25295*; *26276*; *26277*; *32064*; *41363*.

6. **Dryopteris patula** (Swartz) Underw., Our Native Ferns, ed. 4, 117, 1893.

—*Aspidium patulum* Swartz, Kongl. Vetensk. Acad. Handl. 1817:64. —Type: Brazil, Minas Gerais, *Freyreiss s.n.* (S).

Aspidium apertum Fée, Mém. Fam. Foug. 8:106. 1857. —*Dryopteris aperta* (Fée) C. Chr., Ind. Fil. 252. 1905. —Syntypes: Mexico. "Huatusco," *Schaffner 73*; "Cuernavaca," *Craveri 736* (ex *Schaffner*) (presumably P).

For additional synonymy, see Christensen (1913:71).

Illustrations: Matuda, Anales Inst. Biol. Univ. Nac. México 27:130. 1956. —Hooker, Sp. Fil. 4:pl. 267. 1862 [as *Nephrodium mexicanum* Presl].

Rhizome erect, clothed with numerous spreading, reddish-tan, sublustrous, concolorous scales to 2.5 cm long, 3 mm wide, these lanceolate-acuminate, often toothed; fronds arching, mostly 35–100 cm long, to 30 cm broad, deltoid-lanceolate, 3-pinnate-pinnatifid below, becoming 2-pinnate-pinnatifid distally; stipe stramineous or sometimes brownish, base with persistent scales similar to those of rhizome, about half as long as blade, to 7 mm diam.; pinnae subopposite to alternate, often strongly ascending at 45–60° angle to rachis, lowermost largest, deltoid, ± equilateral or only slightly basiscopically developed, medial and distal pinnae lanceolate, inequilateral, pinnules of basiscopic side shorter and more oblique; ultimate segments entire to crenate, not usually toothed; leaf tissue membranous to subsucculent, dark green to yellowish green, glabrous to minutely and inconspicuously capitate-glandular (especially on rachises and costae); indusia with a relatively large, orbicular-reniform, tan to brownish indusium; *n* = 41 (Jam., Edo. Méx.).

Terrestrial, epipetric, or sometimes epiphytic in Tropical Deciduous Forest, Seasonal Evergreen Forest (especially cafetals), Montane Rain Forest, Pine-Oak Forest or Pine-Oak-Liquidambar Forest, Pine-Oak-Arbutus Forest; common and widespread in Northern Highlands, Central Plateau, Sierra Madre, Pacific Coastal Plain, Central Depression; 200–2400 m. As circumscribed here, occurring in s Mex. (Ver.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. and Ven., to nw Arg., Braz.); Jam., Hisp. Chiapas Collections: *P 6725* (BM, NY, UC, US); *P 6726* (NY, UC, US); *P 6867* (UC, US); *P 7243* (UC), *7243B* (BM); *EM 2452* (K, MEXU, NY); *X&S X-465* (US); *GM 8* (DS, US); *A 1353* (UC); *G 232* (BM, K, PH); *G 232A* (K, YU); *T&L 41420* (DS); *21787*; *21937*; *22556*; *23226*; *23359*; *28534*; *32132*; *37283*; *37637*; *37683*; *39940*; *40065*; *40114*; *40217*; *40462*; *40718*; *40846*; *41186*; *41337*.

I regard as a distinct species plants from western Mexico that have gone under the name *D. patula* var. *rossii* (C. Chr.) C. Chr. *Dryopteris rossii* C. Chr. differs from *D. patula* in the smaller and less numerous rhizome and stipe base scales that have a blackened tip, and the generally smaller and more deltoid blade with pinnae spreading rather than ascending.

Species to Be Looked for in Chiapas

Dryopteris cinnamomea (Cav.) C. Chr. —Known from Chih., Dgo., Mich., Méx., D.F., Hgo., Pue., and Oax. Closely related to *D. patula*, but differing in the generally smaller blade and the slightly larger grayish indusia; rhizome short-creeping in most specimens seen.

Dryopteris filix-mas (L.) Schott —Reported by Christensen (1913) from the states of Méx., Oax., and Pue. I have seen specimens from the two first-named states as well as from Guatemala. All Chiapas collections previously identified as this species are *D. parallelogramma*, which is related but readily distinguishable. Whether Mexican collections are really the same as U.S. and European material of *D. filix-mas* is questionable. If not, the name *Aspidium pseudo-filix-mas* Fée (Mém. Fam. Foug. 8:103. 1857), type from "Vallée du Mexique" (*Schaffner 253*, isotype K!), is probably applicable.

Dryopteris glandulifera (Liebm.) C. Chr. —Known only from the type from Oaxaca ("Trapiche de la Concepcion," Liebmann Pl. Mex. 2395, Fl. Mex. 196 and 197, C!; isotypes BM! K! P!). Small, finely cut fronds less than 20 cm long, densely stipitate-glandular. As Christensen suggested, this may be a small form of *D. rossii*.

Dryopteris indecora (Liebm.) C. Chr. —Known only from the type from Oaxaca ("circa Yavesia," Liebmann Pl. Mex. 2417, Fl. Mex. 465, C!). Fronds bipinnate-pinnatifid, with reduced lower pinnae. As Christensen suggested, perhaps a form of *D. cinnamomea*.

Dryopteris rossii C. Chr. —See discussion under *D. patula*.

Dryopteris sp. —*Breedlove 24320* (DS), from the summit of Volcán Tacaná, probably represents an undescribed species of *Dryopteris*. The collection is sterile and so I hesitate to describe it, although I have little doubt of its distinctness. The fronds are deeply pinnate-pinnatifid to barely bipinnate. It may be closest to *D. filix-mas*, but even that relationship appears remote.

40. ELAPHOGLOSSUM

(contributed by John T. Mickel, New York Botanical Garden)

Elaphoglossum Schott ex J. Smith, J. Bot. (Hooker) 4:148. 1841, nom. cons. —Type: *Elaphoglossum conforme* (Swartz) J. Smith [≡*Acrostichum conforme* Swartz, typ. cons.].

Aconiopteris Presl, Tent. Pterid. 236. 1836. —Type: *Aconiopteris subdiaphana* (Hook. & Grev.) Presl [=*Elaphoglossum nervosum* (Bory) Christ].

Hymenodium Fée, Mém. Fam. Foug. 2:20, 80. 1845. —Type: *Hymenodium crinitum* (L.) Fée [≡*Elaphoglossum crinitum* (L.) Christ].

Plants generally epiphytic in wet montane forests and evergreen cloud forests, a greater percentage terrestrial at high elevations; rhizome short- to long-creeping, rarely erect, slender to stout (1–15 mm diam.); rhizome scales orange to black, basally attached or peltate, entire to toothed; fronds 2–200 cm long, erect, spreading, or pendent, simple (pedate in one South American species); stipe glabrous or scaly, sometimes also with minute glandular hairs; stipe long or very short, base often darker (phyllopodium) with abscission at its upper demarcation rather than at the rhizome; blade linear to ovate or oblanceolate, apex acuminate or caudate to obtuse, base rounded to long-attenuate; midvein grooved adaxially, usually with scales of stipe abaxially; veins generally free, rarely netted or with a marginal commissural vein, simple to twice-forked, ending near margin, those stopping well short of margin usually ending in conspicuous hydathodes; blade scales sometimes different from those of rhizome or stipe, abundant to lacking, often greatly reduced and appearing as stellate hairs; fertile fronds longer or shorter than sterile fronds but generally with narrower blades and proportionally longer stipes; fertile blade completely covered beneath with sporangia (acrostichoid sori); sporangia long-stalked, the annulus erect, interrupted by the stalk; paraphyses in some species but generally lacking; spores bilateral, monolete, most with high crests or low ridges, but some echinate or verruculate without ridges or crests.

Rhizome diameter is given, excluding the scale covering. The rhizome scales may be appressed or widely spreading and would too greatly distort rhizome diameter measurements were they included. Stipe bases are differentiated into evident phyllopodia in some but not all species. Blade texture is difficult to determine on the basis of dried material and is given only for those species in which it is clearly distinctive. Although the veins seem to run to the margin in some species, they end just short of it, leaving a pale, thin margin 0.5–1 mm wide, which is often difficult to distinguish, especially in very coriaceous or heavily indumented fronds. This margin is more readily distinguished in the fertile fronds where it remains sterile, in contrast to the acrostichoid sorus of the rest of the abaxial surface. Vein angles and intervein distances are measured at mid-leaf, halfway between the midvein and margin. The scales of the rhizome and blade are generally quite distinct from one another, and on the stipe they intergrade or in some cases remain distinct and occur together. The blade scales, although basically the same type on adaxial and abaxial surfaces, are more highly dissected abaxially. In some this means longer teeth, but in more extreme cases they are reduced to stellate hairs or even to resinous dots. In subglabrous fronds, the blade scales are reduced further in size to minute stellate hairs that are visible only with a hand lens. On the fertile blade, the adaxial surface scales are similar to those of the sterile blade, but abaxially the scales are generally limited to the midvein and in only a few species are there scales among the sporangia. Another type of indument is the presence of minute erect glandular hairs, which are found in varying degrees on the stipe and occasionally on the blade in *E. lindenii, E. erinaceum, E. albomarginatum, E. tambillense,* and their relatives outside of Chiapas.

There are probably well over 500 species in the genus, about three-fourths of them occurring in tropical America. There are 32 species recognized in Chiapas, although our knowledge of them is far from complete. Several are known from only one or a few specimens. The genus is very difficult taxonomically. There are many species and few characters, and the genus has not been adequately treated with a usable subgeneric breakdown until recently. Variation of the characters—such as plant size, blade form, scale color, scale type—is not fully understood in terms of species delimitation. The characters lie mostly in the scales of the rhizome and blade. The fertile fronds add characters of relative size, intersporangial scales, and spore details, but virtually all the species can be identified on the basis of vegetative material. Unfortunately, collectors are hesitant to collect sterile material, and thus many records have gone uncollected.

References: Mickel, J. T., and L. Atehortúa G. 1980. Subdivision of the genus *Elaphoglossum.* Amer. Fern J. 70: 47–68; Christ, H. 1899. Monographie des Genus *Elaphoglossum* [abbreviated herein as "Monogr. Elaph." without citation of serial]. Neue Denkschr. Allg. Schweiz. Ges. Gesammten Naturwiss. 36(2):1–159.

a. Sterile frond bearing linear-lanceolate scales that are usually inrolled to appear hairlike (subulate), at least on stipe but generally throughout frond, and/or with veins ending in hydathodes.

b. Blade scales dark brown or black, concentrated on stipe, blade margin, and midvein, with virtually none on blade surface; hydathodes lacking.

c. Blade scales abundant . . . . 9. *E. erinaceum*

cc. Blade scales very sparse to lacking.

d. Rhizome scales maroon, bristlelike; blade lanceolate; apex caudate . . . . 29. *E. tambillense*

dd. Rhizome scales orange, straplike; blade ovate-lanceolate; apex acute to acuminate, rarely caudate . . . . 4. *E. albomarginatum*

bb. Blade scales orange or brown, more or less evenly distributed on blade although scales of surface may be much smaller than those of midvein and margin; hydathodes evident or not.

e. Blade linear, margin crenulate; marginal and midvein scales larger than those of blade surface . . . . 10. *E. eximium*

ee. Blade linear to lanceolate, margin entire; marginal and midvein scales not especially larger than those of blade surface.

f. Fronds 2–4, rarely to 8 cm long; blade usually obovate-lanceolate; hydathodes inconspicuous . . . . 22. *E. piloselloides*

ff. Fronds generally 8–80 cm long; blade ovate to narrowly elliptic; hydathodes conspicuous.

g. Rhizome long-creeping; blade scales flat, not hairlike . . . . 6. *E. chiapense*

gg. Rhizome short-creeping; blade scales hairlike, with inrolled margins.

h. Blade truncate to subcordate at base; fertile fronds with no scales among the sporangia.

i. Blade ovate-lanceolate, apex cuspidate, base subcordate; spores with low crests . . . . 17. *E. lindenii*

ii. Blade linear-lanceolate, apex acuminate, base narrowly truncate; spores echinate, lacking crests or ridges . . . . 7. *E. crinipes*

hh. Blade cuneate at base; fertile fronds with scales among the sporangia.

j. Fronds small, 8–18 cm long, 0.8–1.4 cm broad; blade conspicuously scaly, linear to linear-lanceolate; margin entire . . . . 27. *E. setosum*

jj. Fronds 10–34 cm long, 1.2–2.7 cm broad; blade very sparsely scaly, lanceolate to linear-lanceolate; margin slightly crenulate . . . . 15. *E. lanceum*

aa. Sterile frond virtually glabrous with only minute stellate hairs to densely scaly; scales various (broadly lanceolate or ovate, ciliate, stellate, round-peltate) but not subulate; hydathodes lacking.

k. Scales present on blade and stipe.

l. Abaxial surface with stellate hairs or resinous dots (other types may be present also).

m. Rhizome scales orange, dull . . . . 23. *E. pilosum*

mm. Rhizome scales castaneous to black, lustrous.

n. Scales of stipe and adaxial blade surface round, peltate . . . . 30. *E. tectum*

nn. Scales of stipe and adaxial blade surface ovate, lanceolate, or stellate.

o. Blade apex obtuse; blade scales ovate, entire, mostly along margin; rhizome ascending . . . . 14. *E. huacsaro*

oo. Blade apex acuminate; blade scales lanceolate or stellate, along margin or on blade surface; rhizome short-creeping.

p. Scales of rhizome and stipe base entire; stipe ca. ¼–⅓ of frond length; blade 10–30 cm long . . . . 21. *E. petiolatum*

pp. Rhizome scales with short teeth; scales of stipe base deeply toothed; stipe ⅓–⅔ of frond length; blade 4–9 cm long . . . . 12. *E. gratum*

ll. Abaxial surface bearing scales but lacking resinous dots and stellate hairs.

q. Blade 3–4.8 cm broad, ovate-lanceolate to elliptic with obtuse tip; spores verruculate.

r. Rhizome scales entire; stipe scales erose; blade scales with cilia shorter than width of scale body; rhizome short-creeping to erect . . . . 19. *E. muscosum*

rr. Rhizome scales ciliate; stipe scales ciliate; blade scales with cilia as long as width of scale body; rhizome moderately to short-creeping . . . . 8. *E. engelii*

qq. Blade 0.6–3.2 cm broad, lanceolate, linear-lanceolate, or narrowly elliptic, apex acute to acuminate, rarely obtuse; spores with crests or ridges, not verruculate.

s. Rhizome scales tan to orange with irregular dark streaks . . . . 3. *E. alan-smithii*

ss. Rhizome scales uniformly colored or with dark tips, lacking dark streaks.

t. Rhizome long-creeping . . . . 18. *E. mathewsii*

tt. Rhizome short-creeping.

u. Abaxial blade surface densely covered with scales, usually obscuring veins and lamina; stipe scales black or orange; occasionally, blade scales less abundant but stipe scales black . . . . 20. *E. paleaceum*

uu. Abaxial blade surface scaly but veins and lamina evident; stipe scales tan to dark orange.

v. Stipe long, ⅓–½ of frond length . . . . 12. *E. gratum*

vv. Stipe short, ⅛–¼ of frond length.

- w. Rhizome scales orange with long hair-teeth; stipe scales abundant and spreading; stipe ⅛–¼ of frond length .... 5. *E. auricomum*
- ww. Rhizome scales dark, entire or toothed; stipe scales not conspicuously spreading; stipe ca. ¼ of frond length.
  - x. Rhizome scales entire or with short, weak teeth; blade scale teeth and margins turned up .... 26. *E. rubescens*
  - xx. Rhizome scales strongly toothed; blade scale teeth and margins more or less plane .... 32. *E. vestitum*

- kk. Scales lacking on blade and stipe except in some cases for minute stellate hairs on blade or a few scales on stipe.
  - y. Rhizome short- to long-creeping, 1–2 mm diam.; rhizome scales often with irregular dark streaks.
    - z. Rhizome scales all orange or tan; phyllopodia lacking; plants epiphytic; fronds 4–8.5 cm long.
      - a′. Blade spathulate .... 28. *E. squamipes*
      - aa′. Blade linear to linear-lanceolate .... 24. *E. revolutum*
    - zz. Rhizome scales mostly tan but at least some with dark streaks; phyllopodia distinct; plants terrestrial or epipetric; fronds 8–30 cm long.
      - b′. Blade 1.2–2.6 cm broad; rhizome long-creeping, fronds 3–30 mm apart .... 2. *E. affine*
      - bb′. Blade 0.6–1 cm broad; rhizome moderately creeping, fronds 1–8 mm apart ...... 31. *E. tenuifolium*
  - yy. Rhizome short-creeping, 2–10 mm diam.; rhizome scales always of uniform color.
    - c′. Veins with laterally expanded ends, sometimes joining; blade very thin, veins easily seen .... 1. *E. acutissimum*
    - cc′. Veins without laterally expanded ends, never joining; blades mostly coriaceous, veins obscure.
      - d′. Rhizome scales maroon-black, bristlelike.
        - e′. Blade apex obtuse; veins obscure; stipe ½–⅗ of frond length .... 11. *E. glaucum*
        - ee′. Blade apex caudate; veins evident; stipe ⅓–½ of frond length .... 29. *E. tambillense*
      - dd′. Rhizome scales orangish to dark brown, lanceolate to linear-lanceolate.
        - f′. Blade ovate-lanceolate; base rounded; veins evident; blade thin, with an occasional subulate scale, especially when young .... 4. *E. albomarginatum*
        - ff′. Blade linear to linear-lanceolate or oblanceolate; base cuneate to long-attenuate; veins obscure; blade coriaceous; subulate scales never present.
          - g′. Blade oblanceolate, base long-decurrent .... 25. *E. rigidum*
          - gg′. Blade narrowly elliptic, base cuneate but not long-decurrent.
            - h′. Rhizome 4–10 mm diam., excluding scales; rhizome scales orange, tan, or dirty brown, rarely somewhat lustrous, never deciduous .... 16. *E. latifolium*
            - hh′. Rhizome 2–4 mm diam., excluding scales; rhizome scales lustrous dark brown, often deciduous, leaving a naked rhizome .... 13. *E. guatemalense*

1. Elaphoglossum acutissimum Christ, Bull. Herb. Boissier (2)5:730. 1905.

—Type: Mexico, Chiapas, San Pablo, *Münch 168* (isotypes DS! US).

Illustrations: apparently none.

Rhizome short-creeping, to 3 mm diam.; rhizome scales linear-lanceolate, lustrous, brown, somewhat resinous, to 2 mm long, entire; phyllopodia indistinct; fronds clumped, 24–74 cm long, 1.7–4.5 cm broad; stipe ⅒–⅕ frond length, clothed with minute, stellate, appressed hairs; blade narrowly elliptic, apex long acuminate, base cuneate; very thin; veins evident, free, simple or once-forked, 1.5–2 mm apart, running at 60–70° angle; hydathodes lacking, but vein tips expanded laterally, sometimes uniting; blade scales lacking but minute, stellate, reddish resinous hairs present, mostly on abaxial surface; fertile fronds about equal to the sterile in length, but with longer stipe (ca. ½ fertile frond length) and narrower blade; scales lacking from abaxial surface; spores with sparse, smooth ridges and small protuberances between the ridges.

Epiphytic, in Montane Rain Forest; uncommon in Sierra Madre, Central Plateau, Eastern and Northern highlands (Jitotol Ridge); 800–2500 m. Southern Mex. (Oax., Ver.), Guat. Chiapas Collections: *31627*; *32382*; *32994*; *34389*; *GM 168* (DS).

This species is distinguished from other species by its very thin blade and laterally expanded vein ends. Specimens from Chiapas seem to have shorter, more resinous rhizome scales than do those of Guatemala, but since both conditions are found in Oaxaca, it is presumed to be a variable character in the species. *Elaphoglossum lonchophyllum* (Fée) (Mém. Fam. Foug. 8:68. 1857) Moore (Ind. Fil. 11. 1857) may actually be the same, in which case it would be the correct name for the species. The description says it is thin-textured "papery and translucent," but I have not seen the type nor other authentic material.

2. Elaphoglossum affine (Mart. & Gal.) Moore, Ind. Fil. 4. 1857.

—*Acrostichum affine* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):24, pl. 3, fig. 1. 1842. —Type: Mexico, Veracruz, Volcán Orizaba, *Galeotti 6454* (BR!; isotype LE!).

Illustration: the original; Moore, Bull. Soc. Bot. Genève (2)6:172. 1914.

Rhizome short- to long-creeping, 1–2 mm diam.; rhizome scales dense to sparse, ovate, orange or tan with varying degrees of dark, shiny, sclerotic streaking, ca. 3 mm long, deeply cordate, appearing nearly peltate, entire or with occasional small, irregular teeth; phyllopodia distinct; fronds spaced 3–30 mm apart, 7–30 cm long, 1.2–2.6 cm broad; stipe ½–⅔ frond length, glabrous or with tan, ovate scales; blade narrowly elliptic, apex acute to obtuse, base cuneate; coriaceous; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at 60–70° angle; hydathodes lacking; blade scales sparse; minute, stellate hairs on abaxial surface, more sparse adaxially; fertile fronds similar to the sterile in blade size and shape but often somewhat longer; scales lacking on abaxial surface; spores with low ridges.

Terrestrial or epipetric, in Evergreen Cloud Forest; rare in Sierra Madre; 2600–3600 m. Mexico (D.F., Méx., Mich., Gro., Oax., Ver.), Guat. CHIAPAS COLLECTIONS: *24307*; *40331* pt.; *42809*.

This species along with *E. tenuifolium* and *E. alan-smithii* form a very close group, all with darkly streaked rhizome scales, but differ in their blade shape and details of blade scaliness. This group is very close to *E. leptophyllum* (Fée) Moore of the West Indies and South America. *Elaphoglossum affine* also closely resembles *E. guatemalense*, which has a shorter rhizome and rhizome scales that are uniformly dark lustrous brown, not orange-tan with dark streaks.

3. **Elaphoglossum alan-smithii** Mickel, Brittonia 32:334. 1980.

—TYPE: Mexico, Oaxaca, Distrito Ixtlán, trail from San Pedro Nolasco to the Llano Verde, 6000–6800 ft, 4 Oct. 1969, *Mickel 3739* (NY!).

ILLUSTRATION: none.

Rhizome moderately creeping, ca. 2 mm diam.; rhizome scales dense to sparse, ovate-lanceolate, tan with varying degrees of dark, shiny, sclerotic streaking, 2–4 mm long (deeply cordate, appearing peltate), entire or with occasional small, irregular teeth; phyllopodia distinct; fronds spaced 2–10 mm apart, (4) 9–22 (41) cm long, 0.9–2.6 cm broad; stipe ⅙–⅓ frond length, with sparse tan ovate scales, at least at base; blade narrowly elliptic, apex acuminate, base cuneate; coriaceous; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at 60–70° angle; hydathodes lacking; adaxial blade surface essentially glabrous, abaxial surface with very slender scales, linear with hastate or stellate base, to deeply stellate; fertile fronds similar to the sterile in blade size and shape but usually somewhat longer; scales lacking on abaxial surface; spores with low ridges.

Epiphytic, Pine-Oak Forest, Evergreen Cloud Forest; rare in Sierra Madre, Central Plateau; 2400–3000 m. Southern Mex. (Oax.). CHIAPAS COLLECTIONS: *22732*; *40809*.

This species closely resembles *E. affine* in the streaking of the rhizome scales and the general size and blade shape but is noticeably more scaly and the apex is distinctly acuminate. The type collection consists of plants about the size of specimens of *E. affine* (4–22 cm long), but *Mickel 3735* from the same locality has longer fronds (28–41 cm).

4. **Elaphoglossum albomarginatum** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:220, fig. 4A. 1975.

—TYPE: Mexico, Chiapas, Unión Juárez, Volcán Tacaná, *Breedlove* (with *Smith*) *31629* (DS!).

ILLUSTRATION: only the original.

Rhizome short-creeping, stout, to 10 mm diam.; rhizome scales orange to brown, ribbonlike or nearly hairlike, to 10 mm long; phyllopodia lacking; fronds clumped, 26–60 cm long, 5.0–8.5 cm broad; stipe ⅓–½ frond length, with spreading, subulate scales or glabrous, usually with minute, erect, glandular hairs; blade ovate-lanceolate, apex acute to acuminate, rarely caudate, base rounded; veins evident, free, once- or twice-forked, 1.5–2 mm apart, running at 70–80° angle; hydathodes lacking; margin pale, ca. 0.5 mm wide; blade completely lacking scales but with minute, black, stellate hairs; fertile fronds smaller than the sterile, with a conspicuous sterile margin (ca. 1 mm wide); scales lacking on abaxial midvein and among the sporangia; spores with relatively few slender ridges with some spicules on and between the crests.

Epiphytic, epipetric, or terrestrial, in Montane Rain Forest; rare in Sierra Madre; 2200 m (1800–2500 m in Guat.). Southern Mex. (Chis. only), Guat. CHIAPAS COLLECTION: *31629*.

This closely resembles a large specimen of *E. tambillense*, but differs not only in size but also in the rhizome scales and the pale margin on both the sterile and fertile fronds. Marginal blade scales are lacking in *E. albomarginatum*, whereas in *E. tambillense* at least an occasional marginal scale is found.

5. **Elaphoglossum auricomum** (Kunze) Moore, Ind. Fil. 7. 1857.

—*Acrostichum auricomum* Kunze, Linnaea 9:28. 1834. —TYPE: Peru, Pampayaco, Jul. 1829, *Poeppig s.n.* (isotype W—photo BM; frag. P!).

Acrostichum obscurum Fourn., Mex. Pl. 1:68. 1872. —*Elaphoglossum obscurum* (Fourn.) C. Chr., Ind. Fil. 312. 1905. —TYPE: Mexico, Veracruz, Misantla, *Hahn s.n.* (P! photo BM).

ILLUSTRATION: Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, to 5 mm diam.; rhizome scales linear-lanceolate, dark orange-brown, to 7 mm long, margin with hairlike teeth; phyllopodia inconspicuous or lacking; fronds clumped, 18–50 cm long, 1.6–3.2 cm broad; stipe ⅛–¼ frond length, densely clothed with spreading, orange scales 4 mm long; blade narrowly elliptic, apex acuminate, base narrowly cuneate; papyraceous; veins indistinct, free, simple or once-forked, 1–2 mm apart, running at 60–70° angle; hydathodes lacking; blade scales orange, liberally distributed but not overlapping, linear-lanceolate, 1–4 mm long with long, hairlike teeth, the teeth at least half as long as scale, some scales reduced to nearly stellate hairs; fertile fronds rare, nearly as long as sterile fronds but narrower and with longer stipes, stipes ca. ⅓ fertile frond length, with a few stellate hairs on abaxial midvein; spores with smooth crests and small protuberances on spore surface between crests.

Epiphytic, Montane Rain Forest; rare in Eastern Highlands, SE Central Plateau; 800–1250 m (to 1650 m in Guat.). Southern Mex. (Oax., Ver.), Guat., Hond., C.R.; S.A. (Col. to Bol.); Hisp. CHIAPAS COLLECTIONS: *32937*; *38933*.

This species is close to *E. vestitum* in the skeletonized blade scales and the general laxness of the fronds, but differs in several features. *Elaphoglossum auricomum* lacks the caudate blade tip, the rhizome scales are not as dark, and the stipe is densely covered with orange spreading scales. It also resembles *E. paleaceum*, but the rhizome scales are dark orange or maroon, not black as usually found in *E. paleaceum*, and the blade scales are more sparse and more highly dissected than in that species. Some specimens have very short stipes, but apparently this character is quite variable in *E. auricomum*.

6. **Elaphoglossum chiapense** A. R. Smith, Proc. Cal. Acad. Sci. (4)40:220, fig. 4B–D. 1975.

—TYPE: Mexico, Chiapas, Munic. Rayón, 10 km above Rayón Mezcalapa along road to Jitotol, *Breedlove 32649* (DS!).

ILLUSTRATION: only the original.

Rhizome moderately to long-creeping, to 2 mm diam.; rhizome scales maroon, lustrous, linear, to 6 mm long, short-toothed, especially along the elongate tip; phyllopodia indistinct or lacking; fronds spaced apart, 7.5–22 cm long, 1.4–2.2 cm broad; stipe $^{1}/_{5}$–$^{1}/_{2}$ frond length; stipe scales linear, maroon, ca. 2 mm long, toothed, appressed; blade narrowly elliptic, apex acute to acuminate, base cuneate; veins evident, free, simple or rarely once-forked, 1.5–2.5 mm apart, running at 50–60° angle; hydathodes evident; blade scales brown, linear-lanceolate with flared base, evenly and sparsely distributed on blade, not noticeably along margin, 2 mm long, with short teeth; fertile fronds smaller than the sterile, fertile blade ca. 3.5 cm long, 1.2 cm broad; stipe ca. $^{4}/_{5}$ fertile frond length; scales lacking on abaxial surface; spores with short crests and holes in spore surface.

On moist banks and rocks, Montane Rain Forest; rare in Northern Highlands (Jitotol Ridge); 1700 m. Southern Mex. (Chis. only), Guat. CHIAPAS COLLECTIONS: *32429*; *32649*.

It resembles *E. lindenii* in the spores but differs in the longer creeping rhizome and the narrower blade. It closely resembles, if not equals, *E. alpestre* (Gardn.) Moore of South America, but *E. chiapense* does not have its blade scales inrolled.

7. **Elaphoglossum crinipes** C. Chr., Kongl. Svenska Vetenskapsakad. Handl. (3)16(2):76, pl. 17, figs. 1–2. 1936.

—TYPE: Haiti, Croix-des-Bouquets, Badeau, *Ekman 7708* (BM!).

ILLUSTRATIONS: the original; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, to 9 mm diam.; rhizome scales linear-lanceolate, reddish orange, to 12 mm long, with short teeth; phyllopodia lacking; fronds clumped, 10–57 cm long, 1.2–4 cm broad; stipe 1.4–1.2 of frond length; stipe scales reddish orange, spreading, subulate, slightly toothed, to 4 mm long; blade linear-lanceolate, apex acuminate, base rounded, truncate, or broadly cuneate; veins distinct, free, simple or once-forked, 1.5–2.5 mm apart, running at 60–70° angle; hydathodes evident; blade scales abundant, reddish orange, subulate, slightly toothed, more dense at margin, spreading to 5–6 mm long, usually less scaly on adaxial surface; fertile fronds slightly shorter than the sterile, to 38 cm long, 2.5 cm broad, with longer stipe (ca. ¾ fertile frond length); fertile blade base subcordate, apex acute; scales lacking on abaxial surface; spores densely echinate, lacking ridges or crests.

Epiphyte, rarely epipetric or terrestrial in Montane Rain Forest; rare in Sierra Madre; 2000–2400 m. Southern Mex. (Oax.), Guat., C.R., Pan.; Hisp. CHIAPAS COLLECTIONS: *31888*; *G 308* (K, NY).

This species closely resembles *E. villosum* (Swartz) J. Smith of the West Indies, but *E. villosum* has scales among the sporangia, and the blade has a caudate apex and a more narrowly cuneate base.

8. **Elaphoglossum engelii** (Karsten) Christ, Monogr. Elaph. 81. 1899.

—*Acrostichum engelii* Karsten, Fl. Columb. 1:118, pl. 59. 1860. —TYPE: Venezuela, "Colombia, cordillera Meridensis," *Karsten s.n.*

ILLUSTRATION: the original.

Rhizome short- to moderately creeping, to 4 mm diam.; rhizome scales linear, reddish orange, 8 mm long, with long hair-teeth; phyllopodia inconspicuous or lacking; fronds clumped to slightly spaced, 24–30 cm long, 2.0–4.2 cm broad; stipe ½ frond length; stipe scales broad, spreading, orange, ca. 2 mm long, with long hair-teeth; blade narrowly elliptic, apex obtuse, base broadly cuneate; subcoriaceous; veins obscure, free, simple or once-forked, ca. 1.5 mm apart, running at 60–70° angle; hydathodes lacking; blade scales on adaxial surface white, lanceolate, with long hair-teeth, on abaxial surface orange and overlapping; fertile fronds slightly longer than the sterile, narrower, with stipe $^{2}/_{5}$ fertile frond length; scales with long hair-teeth, conspicuous and abundant among the sporangia; spores with very short tubercles.

Epiphytic, rarely terrestrial, Evergreen Cloud Forest; not known in Chiapas; 3000–3500 m. Mexico (Méx.), Guat., C.R.; S.A. (Col. to Bol.); Hisp.

This species is commonly mistaken for *E. muscosum*. See the comments under that species for distinguishing features.

9. **Elaphoglossum erinaceum** (Fée) Moore, Ind. Fil. 9. 1857.

—*Acrostichum erinaceum* Fée, Mém. Fam. Foug. 2:41. 1845. —LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:215. 1977): Guadeloupe, Rivière de Saint-Louis, *de Thiouville* (P!).

Acrostichum blepharodes Fée, Mém. Fam. Foug. 2:48, pl. 24, fig. 3. 1845, based on *Acrostichum crinitum* sensu Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):25. 1842 (not L., 1753). —*Elaphoglossum blepharodes* (Fée) Moore, Ind. Fil. 7. 1857. —TYPE: Mexico, Veracruz, Zacuapan, *Galeotti 6297* (BR! photo BM).

Acrostichum nitidum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:168. 1849. —*Elaphoglossum fimbriatum* Moore, Ind. Fil. 356. 1862 (not *Elaphoglossum nitidum* Brack., 1854). —TYPE: Mexico, Puebla, Chinautla, *Liebmann* [Liebm. Pl. Mex. 2421, Fl. Mex. 25 and Fl. Mex. 26] (C! isotype P!).

Acrostichum mexicanum Fourn., Mex. Pl. 1:63. 1872. —TYPE: Mexico, Puebla, Chinautla, Tizutlán, *Liebmann s.n.* (P!; isotype K!).

ILLUSTRATIONS: Fée, Mém. Fam. Foug. 2:pl. 24, fig. 3. 1845 [*A. blepharodes*]; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, to 7 mm diam.; rhizome scales linear, orange, to 17 mm long, entire or with very irregular teeth near tip; phyllopodia lacking; fronds clumped, 23–73 cm long, 2.3–8.0 cm broad; stipe ⅓–½ frond length; stipe scales dark reddish brown, subulate, widely spreading, to 5 mm long, also with minute, erect, glandular hairs on stipe and midvein; blade lanceolate to elliptic, apex acuminate to caudate, base cuneate to rounded; veins evident, free, simple or once-forked, 1–2 mm apart, running at 70–80° angle; hydathodes lacking; blade scales subulate, dark reddish brown, often appearing black, mostly on midvein and spreading from margin; also minute simple, branched, or stellate hairs on abaxial surface; fertile fronds considerably shorter than the sterile (ca. ½ length of the sterile) and somewhat narrower, lanceolate to linear-lanceolate, with a noticeable sterile margin; scales lacking on abaxial surface; spores with broad, low, smooth ridges.

Epiphytic and epipetric, Montane Rain Forest and Evergreen Cloud Forest, also Pine-Oak Forest; common in Eastern and Northern highlands (Jitotol Ridge), Central Plateau, and Sierra Madre; 800–2800 m. Mexico (Jal., Méx., Mlos., Mich., Gro., Oax., Ver.), Guat., Salv., Hond., C.R., Pan.; S.A. (Col. and Ven., s to Bol. and Braz.); W.I. CHIAPAS COLLECTIONS: *15222*; *21510*; *22347*; *22410*; *23194*; *27709*; *29815*; *31630*; *31804*; *32209*; *32420*; *32659*; *32897*; *33592*; *T&L 41427* (DS); *Z 427* (DS); *Gi 4157* (NY); *Anderson & Anderson 5471* (MICH); *MC 2324* (MEXU, US).

Elaphoglossum erinaceum belongs to a very perplexing group. The Chiapas material shows considerable variation in blade size and relative width, rhizome scale size, and habitat. Further study may show this material to represent more than one taxon.

10. **Elaphoglossum eximium** (Mett.) Christ, Monogr. Elaph. 107. 1899.

—*Acrostichum eximium* Mett., Ann. Sci. Nat. Bot. (5)2:199. 1864. —TYPE: Colombia, Manzanos, *Lindig 315* (isotype BM).

Elaphoglossum lineare var. *klotzschii* Hieron., Bot. Jahrb. Syst. 34:552. 1904. —SYNTYPES: Venezuela, Tovar, *Moritz 419*; Tovar, *Fendler 281*. Costa Rica, Volcán Barba, *Hoffman 27*; Talazos, *Lehmann 1234*; La Palma, *Tonduz 12423*. Guatemala, Santa Rosa, *Heyde & Lux (ed. Donnell-Smith 3217)*.

Elaphoglossum cordigerum Christ, Bull. Soc. Bot. Genève (2)1:224. 1909. —SYNTYPES: all from Costa Rica. La Palma, *Tonduz 12423*; *Werckle s.n.*; Irazu, *Pittier 13056*; Tablazo, *Biolley 52*.

ILLUSTRATION: apparently none.

Rhizome ascending, ca. 5 mm diam.; rhizome scales dark, castaneous, lustrous, linear, entire, 3–5 mm long; phyllopodia lacking; fronds clumped, 14–32 cm long, 0.8–1.7 cm broad; stipe short, ca. ⅛ frond length, densely clothed with short, brown, subulate scales; blade linear-elliptic, apex acuminate, base attenuate, margin crenulate; thin; veins evident, free, mostly simple or once-forked, rarely twice-forked, ca. 2 mm apart, running at 45–50° angle; hydathodes evident; scales conspicuous but sparse on midvein, smaller on margin, mostly between crenulations, minute and inconspicuous on blade surfaces; fertile fronds shorter than the sterile, stipe ¾ fertile frond length; blade entire, lanceolate, base truncate to cordate, apex acute; scales lacking among sporangia; spores densely echinate.

Epiphytic, Montane Rain Forest; rare in Northern Highlands (Jitotol Ridge); 1900 m. Southern Mex. (Chis. only), Guat., Salv., Hond., C.R., Pan.; S.A. (Col., Ven.). CHIAPAS COLLECTION: *Gi 4171* (NY).

This species belongs to an interesting complex with relatives in the West Indies, South America, and Africa. It is also closely related to the only pedate-bladed species, *E. cardenasii* Wagner of Peru and Bolivia. Specimens of *E. eximium* are often mistakenly named *E. aubertii* (Desv.) Moore, which is of the same group but occurs in Africa.

11. **Elaphoglossum glaucum** Moore, Ind. Fil. 10. 1857.

—*Acrostichum glaucum* Fée, Mém. Fam. Foug. 8:67. 1857 (nom. illegit.), not Cav. 1799. —TYPE: Mexico, Veracruz, Cordoba, 1854, *Schaffner 16* (P!).

Elaphoglossum eucraspedum Christ, Bull. Herb. Boissier (2)7:415. 1907. —TYPE: Mexico, Chiapas, 1902, *Münch s.n.* (isotype P!).

ILLUSTRATIONS: Fée, Mém. Fam. Foug. 10:pl. 28, fig. 1. 1865; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short- to moderately creeping, ca. 5 mm diam.; rhizome scales linear-deltoid, hairlike most of their length, lustrous reddish brown to nearly black, to 17 mm long, entire; phyllopodia distinct; fronds clumped or spaced a few mm apart, 13–62 cm long, 1.7–3.8 cm broad; stipe 1/2–3/5 frond length, glabrous; blade narrowly elliptic, apex acute to obtuse, base cuneate; coriaceous; veins obscure, free, curved, simple or once-forked, 1–1.5 mm apart, running at ca. 70° angle; hydathodes lacking; blade glabrous to sparsely beset with minute, linear, hastate scales up to 1–2 mm long; fertile fronds slightly shorter to somewhat longer than the sterile but otherwise nearly equal in blade size and shape; spores with broad, low, smooth ridges.

Epiphytic, Evergreen Cloud Forest; infrequent in Central Plateau, Sierra Madre; 2700–3000 m. Mexico (Jal., Méx., Mich., Gro., Oax., Ver.), Guat. CHIAPAS COLLECTIONS: *22033*; *22731*; *40364*.

The species is most easily distinguished by the obtuse blade tip and the dark, bristlelike rhizome scales. *Elaphoglossum guatemalense* may sometimes be fairly blunt-tipped but has shorter, broader rhizome scales and consistently has a more slender rhizome and minute stellate hairs on the lower blade surface. *Elaphoglossum latifolium* has orange or brownish rhizome scales, and its blade is acuminate.

This species was originally described illegitimately by Fée as a later homonym, so Moore's use of the name under *Elaphoglossum* made him the sole author. The type has golden rhizome scales, in contrast to the dark maroon scales typical of most specimens. Specimens at NY from Orizaba have castaneous scales, and material from Jalisco, Guerrero, and Michoacán have golden scales, so apparently scale color is variable in the northern part of the range.

12. **Elaphoglossum gratum** (Fée) Moore, Ind. Fil. 10. 1857.

—*Acrostichum gratum* Fée, Mém. Fam. Foug. 8:69. 1857. —SYNTYPES: Mexico, México, Popocatepetl, *Schaffner 279, 322b*.

Acrostichum callolepis Fée, Mém. Fam. Foug. 8:69. 1857. —*Elaphoglossum callolepis* (Fée) Moore, Ind. Fil. 7. 1857. —TYPE: Mexico, *Galeotti s.n.*

Acrostichum roezlii Schaffn. *in* Fée, Mém. Fam. Foug. 8:69. 1857. —*Elaphoglossum roezlii* (Schaffn. *in* Fée) Moore, Ind. Fil. 14. 1857. —TYPE: Mexico, México, Popocatepetl, *Schaffner 280*.

ILLUSTRATION: Fée, Mém. Fam. Foug. 10:pl. 30, figs. 1, 2. 1865.

Rhizome short- to moderately creeping, to 4 mm diam.; rhizome scales linear-lanceolate, dark brown, lustrous, toothed, ca. 5 mm long; phyllopodia distinct to indistinct; fronds clumped, 8–20 cm long, 0.8–1.2 cm broad; stipe ⅓–⅔ frond length; stipe scales linear-lanceolate and dark-toothed or dark-tipped, spreading, 3 mm long, some more dissected like stellate hairs and appressed; blade narrowly elliptic, apex acute to acuminate, base narrowly cuneate; veins obscure, free, simple or once-forked, 0.6–1.0 mm apart, running at 55–65° angle; hydathodes lacking; blade scales evenly and liberally distributed adaxially but not overlapping, linear-lanceolate, 1–1.5 mm long, with hair teeth, on abaxial surface often reduced to resinous dots; fertile fronds generally longer than the sterile and very long-stiped (ca. 5/6 fertile frond length), blade more acute or obtuse at apex, base more broadly cuneate; scales on abaxial midvein but not among the sporangia; spores with slender, smooth crests with sparse spicules.

Terrestrial, Evergreen Cloud Forest; not yet found in Chiapas; 2500–3400 m. Mexico (Dgo., Aguasc., Méx., Oax., Ver.), Guat.

Elaphoglossum gratum is closely allied to *E. paleaceum*, but is smaller, longer-stiped, less scaly, and terrestrial. It is somewhat like *E. pilosum*, which is also scaly, terrestrial, and of high elevation, but *E.*

pilosum has blade scales with little body to them and the rhizome scales are tan to orange. It also resembles *E. petiolatum,* which has entire rhizome scales, but *E. gratum* usually lacks the laminar resin dots.

13. **Elaphoglossum guatemalense** (Klotzsch) Moore, Parker's Cat. 1858.

—*Acrostichum guatemalense* Klotzsch, Allg. Gartenzeitung 23:66. 1855. —TYPE: from cultivation in Potsdam, Germany, grown from spores of unknown locality in Guatemala.

Acrostichum salvinii Baker ex Hemsley, Biol. Centr.-Amer. 3:688. 1885. —SYNTYPES: Guatemala, Volcán de Fuego, *Godman & Salvin 54, 226.*

ILLUSTRATION: Moore, Deutsche Gart. 1881:402, pl.

Rhizome short- to moderately creeping, 2–4 mm diam.; rhizome scales lanceolate, lustrous brown, to 5 mm long, entire or with a few weak, short hairs; scales sometimes deciduous, leaving a naked rhizome; phyllopodia distinct; fronds clumped to slightly spaced, to 60 cm long, but usually half that long, 1.5–4.0 cm broad; stipe ¼–½ frond length, naked or with minute, reduced, appressed scales; blade linear to linear-lanceolate, apex obtuse to acuminate, base narrowly cuneate; coriaceous; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at ca. 70° angle; hydathodes lacking; blade surfaces glabrous or with minute stellate hairs, especially on abaxial surface; fertile fronds slightly longer than the sterile fronds, stipe longer (½–¾ fertile frond length) and blade narrower; scales lacking; spores with large round bumps or low ridges and sparse spicules.

Epiphytic, rarely terrestrial, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; common in Eastern and Northern highlands, SE Central Plateau, and Sierra Madre; 800–2150 m. Southern Mex. (Oax.), Bel., Guat., Salv., Hond. CHIAPAS COLLECTIONS: *14964* pt.; *19952*; *21074*; *21880*; *23166*; *25046*; *25365*; *27610*; *29868*; *29915*; *30816*; *31506*; *32123*; *32452*; *32507*; *32916*; *37034*; *38857*; *38978*; *41984*; *GM 46* (DS); *Somers 198* (NY), *216* (NY).

I have placed under this name those essentially glabrous specimens which have slender, creeping rhizomes and short, lanceolate, lustrous, brown rhizome scales. There may in fact be more than one element here, as some specimens seem especially narrow with acuminate apices, some broader with bluish-green blades and acuminate apices, with the bulk of the specimens with obtuse to acute apices.

14. **Elaphoglossum huacssaro** (Ruiz) Christ, Monogr. Elaph. 96. 1899.

—*Acrostichum huacssaro* Ruiz, Disertac. sobre la raíz de la Ratánhia 42. 1799. —TYPE: Peru, "habitat in Andinum montibus ad Sanatolmas et Tarmae provincias," *Ruiz s.n.*

ILLUSTRATION: Fée, Mém. Fam. Foug. 10:pl. 29, fig. 1. 1865.

Rhizome ascending, often 5–10 cm long, 3–5 mm diam.; rhizome scales lanceolate, dark, lustrous, entire, 1–2 mm long; phyllopodia lacking; fronds clumped, 17–34 cm long, 0.8–1.6 cm broad; stipe ¼–⅓ frond length; stipe scales ovate, dark to pale, 1 mm long, mostly appressed, a few spreading; blade linear, apex acute to obtuse, base narrowly cuneate; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at ca. 60° angle; hydathodes lacking; blade scales reduced to resinous dots on both surfaces, scales along blade margin ovate and entire; fertile fronds far exceeding the sterile in length, but blade narrower, stipe nearly as long as entire sterile frond; scales lacking among the sporangia; spores with low, broad ridges with many spicules that frequently coalesce at base to form minicrests.

Epiphytic, Pine-Oak Forest and Montane Rain Forest; uncommon in Northern Highlands (Jitotol Ridge) and Central Plateau; 1700–2200 m. Southern Mex. (Chis. only), C.R., Pan.; S.A. (Col. to Bol.); W.I. CHIAPAS COLLECTIONS: *22412*; *23167*; *32336*.

This species seems to be most closely allied to *E. petiolatum* with its laminar resin dots, but the narrow blade, obtuse apex, and long rhizome are distinctive.

15. **Elaphoglossum lanceum** Mickel, Amer. Fern J. 69:101. 1979.

—TYPE: Mexico, Oaxaca, Cerro Zempoaltepetl, *Mickel 4900* (NY! isotypes F! UC! US!).

ILLUSTRATION: none.

Rhizome short-creeping to erect, 1 mm diam.; rhizome scales linear-lanceolate, reddish brown, 7 mm long; phyllopodia lacking; fronds clumped, 9–34 cm long, 1.6–2.7 cm broad; stipe ½ frond length; stipe scales red-brown, strongly spreading, subulate, to 6 mm long; blade lanceolate to linear-lanceolate, apex acuminate, base cuneate; very thin; margin entire to crenulate; veins conspicuous, free, simple or once-forked, 2–3 mm apart, running at 35–40° angle; hydathodes evident; blade scales orange-brown, subulate, 3–5 mm long, sparse; fertile fronds shorter than the sterile, ca. 16 cm long, blade apex acuminate, base cuneate; blade shorter in proportion to length of sterile blade (e.g., 13 cm long, 4.8 cm broad), stipe 2/3–4/5 fertile frond length; scales mixed with the sporangia; spores with highly perforated, lacelike crests.

Epiphytic, Evergreen Cloud Forest; not yet found in Chiapas; 2300–2500 m. Southern Mex. (Oax.), Guat., Salv., Hond. CHIAPAS COLLECTIONS: none.

This species is known only from a few collections, most of which have fronds only 12–20 cm long and distinctly lance-shaped. A large Guatemalan specimen (*Standley 85996*) is strikingly similar to *E. buchii* C. Chr. of Hispaniola and *E. smithii* (Baker) Christ of the Lesser Antilles (which may be identical to each other) in blade form; distant veins; entire, orange, rhizome scales; scales among the sporangia; and the sparsely scaly blade. However, *E. lanceum* has thinner texture, more blade scales, and spores with highly perforated crests, in contrast to the unperforated crests of *E. buchii* and *E. smithii.*

16. **Elaphoglossum latifolium** (Swartz) J. Smith, London J. Bot. 1:197. 1842.

—*Acrostichum latifolium* Swartz, Prodr. Veg. Ind. Occ. 128. 1788. —TYPE: Jamaica, *Swartz s.n.*

Acrostichum sartorii Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:166. 1849. —SYNTYPES: five specimens, all from Mexico, Veracruz: "Baranca de Huitamalco," *Liebmann* [Liebm. Pl. Mex. 2753, Fl. Mex. 661] (C—folio); "Hac. de Mirador," *Liebmann* [Liebm. Pl. Mex. 2730, Fl. Mex. 660; also Liebm. Pl. Mex. 2752, Fl. Mex. 662] (both C, folios); same locality, *Liebmann* [Liebm. Pl. Mex. 2430, Fl. Mex. 12 and Fl. Mex. 14] (C!). Probable isosyntypes: "Hac. de Mirador," *Liebmann s.n.* (BM); "Mirador," *Liebmann s.n.* (K).

Acrostichum scapellum Kunze ex Fée, Mém. Fam. Foug. 9:1. 1857. —*Elaphoglossum scapellum* (Kunze ex Fée) Moore, Ind. Fil. 365. 1862. —TYPE: Mexico, Veracruz, "Bois de la Cordilliere," *Galeotti 6304* (P!).

Acrostichum viride Fourn., Mex. Pl. 1:66. 1872. —*Elaphoglossum viride* (Fourn.) C. Chr., Ind. Fil. 318. 1905. —Type: Mexico, Veracruz, Hacienda de las Ánimas, *Hahn 455* (P! photo US).

Illustrations: Hooker, Fil. Exot. pl. 42. 1859; J. Smith, Hist. Fil. pl. 6. 1875.

Rhizome short-creeping, rarely moderately creeping, 4–10 mm diam.; rhizome scales linear-lanceolate, orange to dull tan or dirty brown, occasionally somewhat lustrous, to 8 mm long, entire; phyllopodia distinct; fronds clumped, rarely slightly spaced, 16–70 cm long, 2.4–7.0 cm broad; stipe usually ¼–⅓ frond length; glabrous or sparsely clothed with spreading, lanceolate, irregularly toothed scales; blade narrowly elliptic, apex acuminate, base cuneate to broadly cuneate; coriaceous; veins obscure, free, simple to twice-forked, ca. 1 mm apart, running at 70–80° angle; hydathodes lacking; blade surfaces glabrous or with minute stellate black hairs on abaxial surface; fertile fronds about equal to sterile fronds in dimensions but sometimes slightly narrower or with longer stipe; spores with short, slender crests with many minute holes in spore surface or with highly perforated crests.

Epiphytic or terrestrial, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest, rarely in Seasonal Evergreen Forest; common in Central Plateau, Sierra Madre, uncommon in Northern and Eastern highlands; 700–3000 m. Mexico (Mlos., Oax., Ver.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. and Ven., s to Bol. and Braz.); W.I. Chiapas Collections: *7812*; *12939*; *14891*; *14964* pt.; *15292*; *21720*; *21797*; *21840*; *21972*; *22014*; *22093*; *22196*; *22345*; *22932*; *23036*; *25041*; *27573*; *27612*; *27982*; *30117*; *31484*; *31628*; *31803*; *31883*; *32038*; *32128*; *32218*; *32674*; *33607*; *33708A*; *38621*; *38688*; *42808*; *C&D 226* (US); *EM 18067* (US), *18091* (DS, F, MEXU, US); *G 251* (K, NY, PH), *269* (K, YU), *274* (YU); *GM 60* (DS); *La 166* (DS), *1860* (DS); *EL 5207* (DS); *JTM 1230* (NY); *R 852* (NY, PH); *T 694* (DS, US), *1754* (DS, US); *Z 110, 185* (DS); *Dr 1610* (GH, MEXU, US); *L&S 9854* (UC, US).

This represents perhaps the most difficult complex in the genus. Being essentially glabrous, the specimens lack a great source of characters. There is much variation in frond size, blade shape, and scale color, shape, and size, but the variation does not seem to fall into readily discernible patterns, so I am here lumping together all those with stout rhizomes under the name *E. latifolium*. There are two distinctly different spore types seen in these plants; those with highly performated, lacy crests seem to have more widely creeping rhizomes, whereas those with many small crests have rhizomes more compact, short-creeping to suberect, but clear distinctions cannot be made at this time.

17. **Elaphoglossum lindenii** (Bory ex Fée) Moore, Ind. Fil. 360. 1862.

—*Acrostichum lindenii* Bory ex Fée, Mém. Fam. Foug. 2:48, pl. 18, fig. 3. 1845. —Type: Mexico, Veracruz, Orizaba, *Galeotti 6263* (Herb. Delessert).

Acrostichum pumilum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):23, pl. 2, fig. 2. 1842 (not *Elaphoglossum pumilum* Lam & Verhey ex H. J. Lam, 1945). —Type: Mexico, Veracruz, Orizaba, *Galeotti 6263* (BR! photo BM; isotype P!).

Acrostichum venustum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:168. 1849 (not *Acrostichum venustum* Fée, 1857). —*Elaphoglossum liebmannii* Moore, Ind. Fil. 360. 1862. —Type: Mexico, Veracruz, Orizaba, *Liebmann* (Liebm. Pl. Mex. 2420, Fl. Mex. 28) (C! —2 sheets).

Illustrations: the original; Christ, Monogr. Elaph. 116, pl. 64. 1899.

Rhizome short-creeping to ascending, ca. 3 mm diam.; rhizome scales linear, maroon, to 8 mm long, with short teeth; phyllopodia lacking; fronds clumped, 7–40 cm long, 1.5–4 cm broad; stipe ½–¾ frond length; stipe scales orange to maroon, subulate, widely spreading, 2–3 mm long; stipe also with a few minute erect glandular hairs; blade ovate to ovate-lanceolate, apex cuspidate, base rounded or subcordate; veins evident, free, simple or once-forked, ca. 2 mm apart, running at 60–70° angle; hydathodes distinct; blade scales subulate, orange to maroon, abundant on abaxial surface, few adaxially, especially spreading from the margin, 2–3 mm long; fertile fronds slightly shorter than the sterile, blade more elliptic, to 4.2 cm long, 2.4 cm broad, stipe to 4/5 fertile frond length; apex obtuse, blade often folded at midvein; scales on abaxial midvein but not among sporangia; spores with low crests and many holes in spore surface.

Terrestrial or epipetric, rarely epiphytic, in Evergreen Cloud Forest; infrequent in Central Plateau and Sierra Madre; 2800–3600 m. Mexico (Gro., Oax., Ver.), Guat., C.R., Pan.; S.A. (Col. to Chile). Chiapas Collections: *22065*; *22806*; *24316*; *40328*.

The plants are usually small but the species is highly variable. It is distinguished by the blade shape, the generally cuspidate blade tip, and the folded fertile blade. It may be mistaken for a small specimen of *E. crinipes* but the latter has lighter colored blade scales, acuminate blade apex, and the spores are echinate. Very small specimens of *E. lindenii* closely resemble plants of *E. piloselloides*, but blade shape can usually distinguish the two.

18. **Elaphoglossum mathewsii** (Fée) Moore, Ind. Fil. 12. 1857.

—*Acrostichum mathewsii* Fée, Mém. Fam. Foug. 2:54, pl. 2, fig. 2. 1845. —Type: Peru, *Mathews s.n.* (W—photo BM; frag. B!).

Acrostichum hartwegii Fée, Mém. Fam. Foug. 2:53, pl. 9, fig. 2. 1845. —*Elaphoglossum hartwegii* (Fée) Moore, Ind. Fil. xvi. 1857. —Type: Colombia, Bogota, *Hartweg 1486*.

Illustrations: originals [*E. mathewsii* and *E. hartwegii*]; Christ, Monogr. Elaph. 87, fig. 43. 1899; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome long-creeping, 1–1.5 mm diam.; rhizome scales linear-lanceolate, castaneous, lustrous with markedly paler margins, with sagittate base, entire, ca. 3 mm long; phyllopodia distinct; fronds spaced, often 1 cm apart, 15–30 cm long, 1.0–2.1 cm broad; stipe ½–⅔ frond length; stipe scales mostly 1–2 mm long, brown with pale margin, appressed to slightly spreading, entire to slightly toothed; blade narrowly elliptic, apex acuminate to acute or obtuse, base cuneate; veins inconspicuous, free, simple or once-forked, 0.8–1 mm apart, running at 60–70° angle; hydathodes present but inconspicuous; blade scales of abaxial surface generally abundant but not overlapping, lanceolate to deltoid, peltate, brown with pale margins, adaxial surface often essentially glabrous; fertile fronds slightly taller than the sterile (stipe ⅔–¾ fertile frond length); scales sparse on abaxial midvein, lacking among the sporangia; spores with low, broad ridges and abundant spicules covering all surfaces.

Epipetric, with *Pinus*, *Juniperus*, and *Buddleia*; uncommon in Sierra Madre (Vol. Tacaná); 3000–3800 m. Mexico (Jal., Méx., Oax.), Guat.; S.A. (Col. and Ven., s to Chile). Chiapas Collections: *24315*; *EM s.n.* (MICH), *2314* (US).

Most likely, *E. hartwegii* and *E. mathewsii* are the same. Fée described them at the same time and carefully distinguished them, *E. hartwegii* having entire scales on both the blade and the rhizome, *E. mathewsii* having ciliate laminar scales and slightly toothed rhizome scales. The former is terrestrial, the latter supposedly epiphytic; the former with upper blade surface glabrous, the latter scaly; the former with fertile fronds longer than the sterile, the latter with fertile and sterile about the same length. These differences, however, do not seem to hold true. Specimens in Mexico and Guatemala tend to be somewhat broader than those of South America, but more intensive studies are necessary in this complex before distinctions can be made with confidence.

19. **Elaphoglossum muscosum** (Swartz) Moore, Ind. Fil. 12. 1857.

—*Acrostichum muscosum* Swartz, Prodr. Veg. Ind. Occ. 128. 1788. —TYPE: Jamaica, *Swartz s.n.* (isotype BM).
Elaphoglossum hookerianum Underw. ex Maxon, Contr. U.S. Natl. Herb. 13:6. 1909. —TYPE: Guatemala, Alta Verapaz, Cobán, *Tuerckheim II. 1862* (NY!).
ILLUSTRATIONS: Schneider, Book of Choice Ferns 1:211. 1892; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping to erect, to 12 mm diam.; rhizome scales linear, reddish orange, to 13 mm long, with short teeth; phyllopodia inconspicuous or lacking; fronds clumped, 13–30 cm long, 1.9–4.8 cm broad; stipe $^{2}/_{5}$–$^{3}/_{5}$ frond length; stipe scales large, light orange with many small teeth, to 6 mm long, spreading; blade narrowly elliptic, or ovate-lanceolate, apex obtuse, base broadly cuneate to rounded; subcoriaceous; veins inconspicuous, free, simple or once-forked, ca. 1 mm apart, running at ca. 60° angle; hydathodes lacking; blade scales of adaxial surface white, or with slightly darker centers, peltate, ovate-lanceolate, long-toothed, abundant, on abaxial surface longer, darker orange, less peltate; fertile fronds as long as sterile fronds, but with smaller blade and longer stipe (ca. ⅓ fertile frond length); scales sparse, small and inconspicuous among the sporangia; spores sparsely covered with short tubercles.

Epiphytic, Montane Rain Forest and Evergreen Cloud Forest, less commonly Pine-Oak-Liquidambar Forest; frequent, Northern Highlands (Jitotol Ridge), Central Plateau, Sierra Madre; 1300–3000 m. Southern Mex. (Oax.), Guat., Salv., Hond., C.R., Pan.; S.A. (Col.); W.I. CHIAPAS COLLECTIONS: *6664*; *12948*; *22016*; *22734*; *23165*; *28211*; *31666*; *31774*; *32020*; *32279*; *32508*; *32627*; *33526*; *38813*; *41374*; *GM 170* (DS); *JTM 1246* (NY); *Z 469* (DS); *Somers 199* (NY); *G 297* (YU).

Elaphoglossum muscosum belongs to a very distinct group of a few species that are distinguished by the blade shape, the densely clothed stipe, and the spore morphology. This species is distinguished from *E. engelii* by the inconspicuous scales among the sporangia, the less toothed scales, and the rhizome habit.

20. **Elaphoglossum paleaceum** (Hook. & Grev.) Sledge, Bull. Brit. Mus. (Nat. Hist.), Bot. 4(2):95. 1967.

—*Acrostichum paleaceum* Hook. & Grev., Icon. Fil. 2: pl. 235, Alph. Index et Syst. Index. 1831. —TYPE: the original figure.
Acrostichum squamosum Swartz, J. Bot. (Schrader) 1800(2):11. "1801" [1802], not Cavanilles, 1799. —*Elaphoglossum squamosum* J. Smith, J. Bot. (Hooker) 4:148. 1841. —TYPE: no type cited.
Elaphoglossum hirtum (Swartz) C. Chr., Ind. Fil. 308. 1905, sensu auct., not *Acrostichum hirtum* Swartz, J. Bot. (Schrader) 1800(2):10. "1801" [1802].
ILLUSTRATIONS: the original; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, to 10 mm diam.; rhizome scales linear-lanceolate, brown to black and opaque, ca. 5 mm long, margin with long, hairlike teeth; phyllopodia distinct; fronds clumped, 10–53 cm long, 0.9–3.5 cm broad; stipe ¼–⅓ frond length, densely clothed with spreading, black or orange scales similar to those of rhizome, scales to 3 mm long; blade narrowly elliptic, apex acuminate, base broadly cuneate to rounded; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at ca. 70° angle; hydathodes lacking; blade scales abundant, overlapping, lanceolate, ca. 2 mm long, long hair-toothed, usually those of stipe and midvein dark, dark ones sometimes scattered in lower part of blade; fertile fronds shorter than the sterile, to 28 cm long, 1.4 cm broad, but with same shape; scales along abaxial midvein and only occasionally among the sporangia; spores with low, broad, smooth ridges.

Epiphytic and epipetric, Montane Rain Forest, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, and Sierra Madre; 1300–3600 m. Southern Mex. (Oax.), Guat., Salv., C.R., Pan.; S.A. (Col. and Ven., s to Bol. and Braz.); W.I.; Azores and Madeira. CHIAPAS COLLECTIONS: *22062*; *22735*; *24308*; *27679*; *28209*; *31753*; *32130*; *32392*; *32510*; *40338*; *40368*; *40810*; *41373*; *41741*; *La 1224* (DS); *L&S 9898* (US).

There is considerable variation in this species, and there may in fact be three taxa here. One group of specimens has a short stipe (ca. ¼ frond length) with large, dense, conspicuous, spreading stipe scales with a narrow (1.0–2.2 cm broad), densely scaly blade; the scales of the stipe and lower midvein are mostly orange (white with age) but are occasionally black-tipped or even entirely black. Another group has a longer stipe ($^{1}/_{3}$–$^{2}/_{5}$ frond length), black, somewhat spreading, less dense stipe scales, broad blade (2.4–3.9 cm broad) that is densely to only moderately covered with scales. A few specimens of high elevation are noticeably smaller (10–18 cm long) with sparse, appressed, black stipe scales and densely scaly blade.

21. **Elaphoglossum petiolatum** (Swartz) Urban, Symb. Antill. 4:61. 1903.

—*Acrostichum petiolatum* Swartz, Prodr. Veg. Ind. Occ. 128. 1788. —*Acrostichum viscosum* Swartz, Syn. Fil. 10, 193. 1806 (nom. superfl., illegit.). —*Elaphoglossum viscosum* (Swartz) J. Smith, J. Bot. (Hooker) 4:148. 1841. — TYPE: Jamaica, *Swartz s.n.* (probable isotype BM).
Acrostichum schiedei Kunze, Anal. 10. 1837. —LECTOTYPE (chosen here): Mexico, Veracruz, Jalapa, *Schiede s.n.* (B!; isotypes NY! P).
Acrostichum schmitzii Mett. ex Kuhn, Linnaea 36:51. 1869. —SYNTYPES: Mexico, *Schmitz 3* pt.; *Schaffner s.n.*; *Karwinski s.n.*
ILLUSTRATION: Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, 3–5 mm diam.; rhizome scales linear, blackish maroon to castaneous with kinky hair tip, ca. 3 mm long, entire; phyllopodia distinct but very short (2–3 mm long); fronds clumped, 10–39 cm long, 0.9–3.4 cm broad; stipe ca. ¼ frond length, clothed with scales 1–2 mm long, some spreading and broader, some narrow and appressed, entire or toothed to stellate; blade narrowly elliptic, apex acuminate, base cuneate; veins visible, free, simple or once-forked, ca. 1 mm apart, running at 60–70° angle; hydathodes lacking; blade scales sparse, linear-lanceolate with hair teeth, mostly on adaxial surface and on young fronds, often more abundant near margins; abaxial surface scales reduced to resinous dots mixed with stellate hairs, or less commonly with only stellate hairs or scales as on adaxial surface, rarely glabrous; fertile fronds about same length as sterile fronds but stipe longer, ca. ⅔ frond length (in greatly reduced specimens the fertile fronds may far exceed the sterile); scales on abaxial midvein; spores with broad, low, smooth ridges.

Epiphytic or terrestrial, Montane Rain Forest and Evergreen Cloud Forest, also Pine-Oak and Pine-Oak-Liquidambar forests; common in Northern Highlands, Central Plateau, Sierra Madre; 800–3000 m. Mexico (Jal., Méx., Mlos., Mich., Gro., Oax., Ver.), Guat., Hond., C.R., Pan.; S.A. (Col. and Ven., s to Peru and Braz.); W.I.; O.W. tropics. Chiapas Collections: *11145*; *21719*; *21881*; *22411*; *22831*; *25427*; *27198*; *27676*; *31552*; *32076*; *32506*; *37287*; *38977*; *40416*; *40730*; *40954*; *EM 1661* (MEXU), *2584* (F, K, MEXU, NY, US), *18067* (F, MEXU, US); *GM 10* (DS, US), *70* (DS); *JTM 1214* NY); *Anderson & Anderson 5472* (MICH); *Gi 4189* (NY); *R 851* (NY); *T&L 41737* (DS); *Z 470* (DS); *L&S 9924* (US), *9964* (UC, US); *G 203* (PH), *314* (BM, K), 433 (YU); *C&D 137* (US).

There is considerable variation in the degree of scaliness, especially on the abaxial surface, and the degree of resinous dotting, but the significance of this variation is not yet understood. *Elaphoglossum petiolatum* closely resembles *E. huacssaro* in the resinous dots of the abaxial blade surface and the frequent concentration of scales along the margin, but *E. huacssaro* has a more erect rhizome, an obtuse blade apex, and the fertile frond longer than the sterile.

22. **Elaphoglossum piloselloides** (Presl) Moore, Ind. Fil. 13. 1857.

—*Acrostichum piloselloides* Presl, Rel. Haenk. 1:14, pl. 2, fig. 1. 1825. —Type: "Hab. in montanis Peruviae," *Haenke s.n.*

Illustrations: Fée, Mém. Fam. Foug. 2:pl. 14. 1845; Hooker, Fil. Exot. pl. 29. 1859; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome erect or ascending, ca. 2 mm diam.; rhizome scales linear, orange, entire, 3–6 mm long; phyllopodia lacking; fronds clumped, 2–4 (8) cm long, 0.4–1.0 cm broad; stipe slender, usually ⅔–¾ frond length, moderately clothed with tan to orange, very narrow, subulate scales, 2–4 mm long; blade obspathulate, obovate-lanceolate to narrowly elliptic, apex obtuse, base broadly cuneate; veins obscure, free, simple or rarely once-forked, ca. 1 mm apart, running at ca. 40–50° angle; hydathodes present but inconspicuous; blade scales somewhat subulate (slightly rolled at base), tan to dull orange, uniformly and moderately covering blade surfaces; fertile fronds as tall or taller than the sterile, more erect, stipe ca. $^{4}/_{5}$ fertile frond length, blade smaller than the sterile, often folded in half, spathulate to nearly round; scales of blade and upper stipe dark brown to black, shining, scale bases not inrolled but spreading and slightly toothed; soral scales absent except for base of midvein; spores with smooth, broad, low ridges.

Terrestrial or epipetric, Pine-Oak and Pine-Oak-Liquidambar forests; infrequent in Northern Highlands (Jitotol Ridge) and Central Plateau; 1350–2400 m. Mexico (Hgo., Jal., Méx., Mich., Gro., Oax., Ver.), Guat., Salv., C.R., Pan.; S.A. (Col. and Ven., s to Chile); W.I. Chiapas Collections: *6921*; *27687*; *32527*; *44381*; *G 313* (F, K, NY); *GM 7* (DS), *69* (DS), *183* (DS); *L&S 9897* (US).

This differs slightly from *E. spatulatum* (Bory) Moore of Réunion and Africa and often is placed under that name. Further study may show them to be the same.

23. **Elaphoglossum pilosum** (Humb. & Bonpl. ex Willd.) Moore, Ind. Fil. 13. 1857.

—*Acrostichum pilosum* Humb. & Bonpl. ex Willd., Sp. Pl. 5:103. 1810. —Type: Venezuela, Tumiriquiri, *Humboldt* "*468*" (B—Herb. Willd. 19512; isotype P! photo BM).

Acrostichum venustum Fée, Mém. Fam. Foug. 8:68. 1857 (not Liebm., 1849). —*Elaphoglossum venustum* Moore, Ind. Fil. 16. 1857. —Type: Mexico, Puebla, Mecameca, *Schaffner 322b, c.*

Acrostichum intermedium Fée, Mém. Fam. Foug. 8:69. 1857. —Type: Mexico, Veracruz, Huatusco, *Schaffner 22.*

Acrostichum muelleri Fourn., Mex. Pl. 1:68, pl. 1, fig. 2. 1872. —*Elaphoglossum muelleri* (Fourn.) C. Chr., Ind. Fil. 311. 1905. —Type: Mexico, Veracruz, Ulnapa, *Müller 41 quinter* (P!).

Acrostichum araneosum D. C. Eaton, Proc. Amer. Acad. Arts 22:461. 1887. —*Elaphoglossum araneosum* (D. C. Eaton) C. Chr., Ind. Fil. 303. 1905. —Type: Mexico, Jalisco, Río Blanco, *Palmer 333* (isotypes K, LE!, NY!).

Elaphoglossum potosianum Christ, Monogr. Elaph. 119. 1899. —Type: Mexico, San Luís Potosí, *Schaffner 77.*

Illustrations: H.B.K., Nov. Gen. 7:pl. 661. 1825; Fourn., Mex. Pl. 1:pl. 1, fig. 2. 1872 [*A. muelleri*]; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, to 5 mm diam.; rhizome scales orange, ovate-lanceolate to nearly deltoid, ca. 2 mm long, entire or weakly toothed; phyllopodia lacking; fronds clumped, 15–33 cm long, 1.2–2.5 cm broad; stipe $^{1}/_{5}$–$^{1}/_{3}$ frond length, clothed with orange scales; scales few, linear-lanceolate, more as stellate hairs, somewhat deciduous with age; blade narrowly elliptic, apex acuminate, base narrowly cuneate; thin; veins visible but not conspicuous, free, simple to twice-forked, 0.4–0.7 mm apart, running at ca. 70° angle; hydathodes lacking; blade scales as stellate hairs on both adaxial and abaxial surfaces with virtually no scale body, ca. 1 mm long, occasionally with a few linear-lanceolate scales on abaxial midvein; fertile frond usually exceeding the sterile and with longer stipe (nearly ½ fertile frond length) and narrower blade (to 0.8 cm broad); stellate scales on abaxial midvein but lacking among sporangia; spores with smooth, low, slender crests.

Terrestrial or epipetric, Pine-Oak and Pine-Oak-Liquidambar forests; infrequent, Northern Highlands (Jitotol Ridge), Central Plateau; 1600–2200 m. Mexico (Chih., Sin., Cma., Nay., Jal., Méx., Mich., Gro., Oax., Pue., Ver.), Guat., C.R.; S.A. (Col. and Ven.). Chiapas Collections: *23083*; *27040*; *Gi 4212* (NY); *T&L 41374* (DS); *A 1274* (UC).

This species is quite variable in degree of scaliness and size of plants. It can be distinguished from *E. petiolatum* and *E. gratum* by its orange rhizome scales. It is most abundant in Mexico and very rare south of Guatemala. The type is from Venezuela, and if that turns out to be a different species, then the correct name for the Mexican-Guatemalan material would be *E. venustum* Moore (1857) or *E. interme-*

dium Fée (1857), depending on exact date of publication.

24. **Elaphoglossum revolutum** (Liebm.) Moore, Ind. Fil. 365. 1862.

—*Acrostichum revolutum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:163. 1849. —Syntypes: Mexico, Oaxaca, Chinantla, Lobani to Petlapa, *Liebmann* [Liebm. Pl. Mex. 2427, Fl. Mex. 4] (C!; isosyntype US!, frag. NY!); Cuba, Bejucal, *Liebmann* [Liebm. Pl. Mex. 2428, Fl. Mex. 3] (C!).

Acrostichum rampans Baker, Syn. Fil. 518. 1874. —*Elaphoglossum rampans* (Baker) Christ, Monogr. Elaph. 56. 1899. —Type: Cuba, *Wright 3959* (K!; isotypes NY!, P!).

Illustration: **Fig. 40.**

Rhizome long-creeping, ca. 1 mm diam.; rhizome scales ovate-lanceolate, orange, ca. 3 mm long, entire; phyllopodia lacking; fronds spaced usually 4–8 mm apart, 5–15 cm long, 0.6–1.1 cm broad; stipe ca. ¼ (to ½) frond length, clothed with orange, ovate, somewhat spreading scales 2 mm long; blade narrowly elliptic, apex obtuse, base cuneate; coriaceous; veins obscure, free, simple or once-forked, ca. 0.8 mm apart, running at ca. 60° angle; hydathodes lacking; blade glabrous or with a few ovate scales on abaxial midvein; fertile fronds exceeding sterile fronds, stipe ½–¾ fertile frond length; blade narrow, to 4 mm wide; scales lacking on abaxial surface; spores with low, broad ridges, with abundant spicules on all surfaces.

Epiphytic, Lower Montane and Montane rain forests; infrequent in Northern and Eastern highlands; 600–1000 m. Southern Mex. (Oax.), Guat., C.R., Pan.; S.A. (Col.); W.I. Chiapas Collections: *21894*; *27432*; *32921*; *41995*; *Nelson 3048* (US).

Closely allied to *E. squamipes* and to *Peltapteris*, as evidenced by the rhizome habit, the scales, and the spores. It is distinguished from *E. affine*, *E. tenuifolium*, and small specimens of *E. guatemalense* by the pale, ovate, rhizome scales and the lack of phyllopodia.

25. **Elaphoglossum rigidum** (Aubl.) Urban, Symb. Antill. 9:374. 1925.

—*Polypodium rigidum* Aubl., Hist. Pl. Guian. 2:963. 1775. —Type: French Guiana, *Aublet s.n.* (isotype BM).

Acrostichum flaccidum Fée, Mém. Fam. Foug. 2:35, pl. 7, fig. 2. 1845. —*Elaphoglossum flaccidum* (Fée) Moore, Ind. Fil. 356. 1862. —Lectotype (chosen by Proctor, 1977:204): Guadeloupe, *l'Herminier s.n.* (P?).

Illustration: Fée original [*Acrostichum flaccidum*].

Rhizome short-creeping, ca. 3 mm diam.; rhizome scales brown, thin, linear-lanceolate, entire, to 6 mm long; phyllopodia distinct; fronds clumped, 22–30 cm long, 2.9–3.6 cm broad; stipe short to nearly lacking, to 1/5 frond length, clothed with a few strongly toothed scales, ca. 2 mm long; blade oblanceolate, apex acuminate, base narrowly cuneate, decurrent; veins inconspicuous, free, simple or once-forked, ca. 1 mm apart, running at 70–80° angle; hydathodes lacking; blade scales many to few minute stellate hairs on abaxial surface, lacking on adaxial surface; fertile fronds about equal in length to sterile fronds or somewhat shorter with stipe nearly half the fertile frond length; scales lacking on abaxial surface; spores with many small crests and minute holes in spore surface.

Epiphytic, Montane Rain Forest; rare on Cerro Tres Picos (Sierra Madre); 2100–2500 m. Southern Mex. (Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Col. and Ven.); W.I. Chiapas Collection: *25371*.

There is some question whether *E. rigidum* and *E. flaccidum* are in fact the same species. More detailed study is needed on all the subglabrous coriaceous species (sect. *Elaphoglossum*) to determine the species boundaries.

26. **Elaphoglossum rubescens** Christ, Monogr. Elaph. 93, figs. 47, 48. 1899.

—Type: Guatemala, *Bernoulli 320*.

Illustration: Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short-creeping, ca. 5 mm diam.; rhizome scales castaneous, lustrous, linear-lanceolate, 2–4 mm long, entire or with short teeth; phyllopodia distinct; fronds clumped, 30–65 cm long, 1.5–3.2 cm broad; stipe ¼–⅓ frond length; stipe sparsely clothed with lanceolate, spreading, toothed scales ca. 2 mm long; stipe more copiously covered with small, appressed scales which are shorter with long hair-teeth, reduced nearly to stellate hairs; blade linear-elliptic, apex caudate, base broadly cuneate; veins obscure, free, simple or once-forked, 1–1.2 mm apart, running at 70° angle; hydathodes lacking; blade scales abundant but not overlapping, adaxial surface scales delicate, white, appressed, round to subdeltoid, with short hair-teeth, or scales lacking with age; abaxial surface scales orange, narrow to deltoid, with long hair-teeth and distinctly upturned margins; blade margin especially scaly with scales flat and overlapping; fertile fronds about equal to sterile fronds in length but with narrower blade (0.7–0.9 cm wide) and longer stipe (⅓–½ fertile frond length), scales on midvein of abaxial surface but not among the sporangia; spores with sparse, low, slender ridges and low protuberances in areas between the ridges.

Epiphytic, Montane Rain and Pine-Oak-Liquidambar forests; uncommon in SE Central Plateau, Eastern Highlands; 800–1300 (2150) m. Southern Mex. (Chis. only), Guat. Chiapas Collections: *22346*; *27568*; *32131*; *32896*.

Elaphoglossum rubescens is most closely allied to *E. vestitum*, resembling it in rhizome scale color and texture, ciliolate blade scales lightly covering the lamina, and lax fronds with caudate tip. The former can be distinguished by the rhizome scales not (or only weakly) toothed, the stipe often with resin dots, and the blade scales with the teeth and margins upturned. These two species may be only varietally distinct, overlapping in Chiapas with several intermediate specimens.

Elaphoglossum auricomum belongs to the same complex but has more abundant spreading stipe scales, the rhizome scales are lighter in color, and the blade has an acuminate apex. Some specimens of *E. paleaceum* have blades only lightly covered with scales, but they have black scales on the stipe and lower rachis.

27. **Elaphoglossum setosum** (Liebm.) Moore, Ind. Fil. 366. 1857.

—*Acrostichum setosum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:169. 1849 (not Wall., 1828, nom. nud.). —*Acrostichum recognitum* Kunze ex Fourn., Mex. Pl. 1:67. 1872. —Type: Mexico, Veracruz, Barranca de Huitamalco, *Liebmann* [Liebm. Pl. Mex. 2433, Fl. Mex. 29 and Fl. Mex 30] (C! isotypes K).

Elaphoglossum catherinae Underw. ex Maxon, Contr. U.S. Natl. Herb. 13:5. 1909. —TYPE: Guatemala, Alta Verapaz, Pansamalá, *Tuerckheim s.n.* [ed. *Donn.-Smith 1003*] (US!; isotypes K!, NY!, UC).
ILLUSTRATION: apparently none.

Rhizome short-creeping, 1–2 mm diam.; rhizome scales linear, with sparse and irregular short teeth, brown to dull orange, 3–5 mm long; phyllopodia lacking; fronds clumped, 11–18 cm long, 1.0–1.5 cm broad; stipe slender, $^1/_5$–$^2/_5$ frond length, moderately clothed with slender, dull orange, subulate, spreading scales 2–3 mm long; blade narrowly elliptic, apex gradually acuminate, base cuneate; thin; veins conspicuous, free, mostly simple or rarely once-forked, 1.5–2 mm apart, running at ca. 40° angle; hydathodes conspicuous; blade scales subulate, dull orange, moderately and uniformly clothing blade surface, more so on abaxial surface, longer and spreading at margin; fertile fronds nearly as long as the sterile but more elliptic with acute apex, ca. 3 cm long and 1.1 cm broad, and longer stiped (ca. ¾ fertile frond length), with abundant scales mixed with the sporangia; spores with many narrow highly perforated crests.

Epiphytic, Montane Rain Forest; rare in SE Central Plateau, Eastern Highlands; 800–1300 m. Southern Mex. (Oax., Ver.), Guat., C.R. CHIAPAS COLLECTIONS: *32246*; *38908*; *Dr 1599* (GH, US).

This species is superficially much like *E. crinipes*, but it can be distinguished by the smaller size, the presence of scales among the sporangia, and quite different spores. It is also like *E. lindenii*, which has more elliptic blades and darker blade scales.

28. **Elaphoglossum squamipes** (Hook.) Moore, Ind. Fil. 15. 1857.

—*Acrostichum squamipes* Hook., Icon. Pl. pl. 197. 1837. —TYPE: Peru, Chacapoyas, *Mathews s.n.* (K!).
Acrostichum ovatum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:164. 1849 (not Hook. & Grev., 1829). —*Elaphoglossum subaequale* Moore, Ind. Fil. 368. 1862, based on *Acrostichum ovatum* Liebm. —TYPE: Mexico, Oaxaca, Cerro Zempoaltepetl, *Liebmann* [Liebm. Pl. Mex. 2431, Fl. Mex. 5] (C! isotype K!).
ILLUSTRATIONS: the original; Fée, Mém. Fam. Foug. 2:pl. 22, fig. 2. 1845; Christ, Monogr. Elaph. 53, 54, figs. 16, 17. 1899; Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome long-creeping, ca. 1 mm diam.; rhizome scales ovate to linear-lanceolate, dull orange, peltate, entire, 3–6 mm long; phyllopodia lacking; fronds distant, 5–8 cm long, 1.2–1.6 cm broad; stipe slender, ca. ½ frond length, moderately clothed with ovate, dull orange scales 2–3 mm long; blade ovate-lanceolate or spathulate, apex obtuse, base broadly cuneate; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at 60–70° angle; hydathodes lacking; blade scales sparse, small, inconspicuous, 1–2 mm long, linear, often coarsely and irregularly toothed, especially toward scale base, more frequent on abaxial surface; fertile fronds as tall or slightly taller than sterile fronds, with longer stipe ca. ¾ fertile frond length, blade spathulate, smaller than the sterile with a few scales along abaxial midvein but lacking among the sporangia; spores with broad, low ridges and abundant spicules covering all surfaces.

Epiphytic, Evergreen Cloud Forest; uncommon in Central Plateau and Sierra Madre; 2800–3000 m. Southern Mex. (Gro., Oax.), Guat., C.R., Pan.; S.A. (Col. and Ven., s to Bol. and Braz.). CHIAPAS COLLECTIONS: *22733*; *31802*; *40447*; *41740*; *GM 120* (DS, US).

Elaphoglossum squamipes represents a distinct group with long-creeping rhizomes and broad, pale rhizome and stipe scales. It is very closely related to *Peltapteris*, which could justifiably be placed in *Elaphoglossum*, differing from *E. squamipes* et aff. only in frond dissection.

29. **Elaphoglossum tambillense** (Hook.) Moore, Ind. Fil. 15. 1857.

—*Acrostichum tambillense* Hook., Icon. Pl. pl. 656. 1844. —TYPE: Ecuador, Tambillo, *Jameson s.n.* (K!; isotype P!).
Acrostichum pallidum Baker ex Jenm., J. Bot. 17 (n.s. 8):263. 1879. —*Elaphoglossum pallidum* (Baker ex Jenm.) C. Chr., Ind. Fil. 312. 1905. —TYPE: Jamaica, *Jenman s.n.* (K!; isotype NY!).
ILLUSTRATION: only the original.

Rhizome short-creeping, to 8 mm diam.; rhizome scales brown to maroon, stiff, to 12 mm long; phyllopodia lacking; fronds clumped, 24–55 cm long, 4.1–5.6 cm broad; stipe ⅓–½ frond length; stipe scales subulate, spreading, sparse or lacking; stipe also with a few minute, erect, glandular hairs; blade narrowly lanceolate, apex caudate, base cuneate to rounded; papyraceous; veins evident, free, once- or twice-forked, 1.5–2 mm apart, running at 70–80° angle; hydathodes lacking; blade scales black, subulate, generally early deciduous, mostly along margin, mature specimens with only a few or totally lacking; blade also with minute, black, stellate hairs; fertile fronds much smaller than the sterile; scales lacking among the sporangia; spores with low, narrow ridges and holes in spore surface.

Terrestrial, epiphytic, or epipetric, Evergreen Cloud Forest; infrequent in Central Plateau and Sierra Madre; 2700–3000 m. Southern Mex. (Oax.), Guat., C.R., Pan.; S.A. (Col., Ecu.); Jam., Hisp. CHIAPAS COLLECTIONS: *22051*; *22804*; *32046*; *40339*; *GM 54* (DS).

This is closely allied to *E. albomarginatum*; see discussion under that species.

30. **Elaphoglossum tectum** (Humb. & Bonpl. ex Willd.) Moore, Ind. Fil. 15. 1857.

—*Acrostichum tectum* Humb. & Bonpl. ex Willd., Sp. Pl. 5:102. 1810. —TYPE: Venezuela, Caripe, *Humboldt "469"* (B—Herb. Willd. 19520!; isotypes LE!, P!).
ILLUSTRATION: Mickel *in* Stolze, Fieldiana, Bot. (in press).

Rhizome short- to moderately creeping, 2–3 mm diam.; rhizome scales linear-lanceolate, dark reddish black, sclerotic, lustrous, ca. 5 mm long, with a few pale, weak hair-teeth; phyllopodia indistinct; fronds clumped to slightly spaced, to 3 mm apart, 60–80 cm long, 1.7–2.6 cm broad; stipe ⅓–½ frond length; stipe scales appressed, peltate, round with dark center and short hair-teeth; blade linear-elliptic, apex long-acuminate, base narrowly cuneate; veins obscure, free, simple or once-forked, mostly 0.7–1 mm apart, running at ca. 80° angle; hydathodes lacking; blade scales on adaxial surface to glabrous with age, white, appressed, round, peltate, toothed, on abaxial surface reduced to stellate hairs; fertile fronds about as long as the sterile or slightly longer but with narrower blade and longer stipe (more than ½ fertile frond length); scales round, peltate on abaxial midvein but lacking among the sporangia; spores with broad, low, smooth ridges.

Terrestrial, epipetric, less commonly epiphytic, Montane Rain Forest; rare in Northern Highlands (Jitotol Ridge); 1700 m (1750–2500 m in Guat.). Southern Mex. (Oax.), Guat., C.R., Pan.; S.A. (Col. and Ven., s to Bol. and Braz.); W.I. CHIAPAS COLLECTION: *23172*.

This species is readily distinguished by the round, peltate scales on the stipe and adaxial surface.

31. **Elaphoglossum tenuifolium** (Liebm.) Moore, Ind. Fil. 368. 1862.

—*Acrostichum tenuifolium* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:11. 1849. —Type: Mexico, Oaxaca, Cerro Zempoaltepetl, *Liebmann* [Liebm. Pl. Mex. 2654, Fl. Mex. 1 and Fl. Mex. 9] (C!).
Illustration: apparently none.

Rhizome short- to moderately creeping, 1–2 mm diam.; rhizome scales dense to sparse, ovate, orange or tan with varying degrees of dark, shiny, sclerotic streaking, ca. 3 mm long, deeply cordate, appearing nearly peltate, entire or with occasional small, irregular teeth; phyllopodia distinct; fronds spaced 1–8 mm apart, 6–23 cm long, 0.6–1.0 cm broad; stipe ¼–⅔ frond length, glabrous or with tan, ovate scales; blade linear-elliptic, apex acuminate, base attenuate; veins obscure, free, simple or once-forked, ca. 1 mm apart, running at 60–70° angle; hydathodes lacking; blade scales sparse; minute stellate hairs or dots on abaxial surface, rare on adaxial surface; fertile fronds similar to the sterile in size and shape or occasionally slightly longer; scales lacking on abaxial surface; spores with low ridges or small narrow crests.

Terrestrial or epipetric, Evergreen Cloud Forest; frequent in Central Plateau and Sierra Madre; 2400–3600 m. Mexico (D.F., Méx., Mich., Gro., Oax., Ver.), Guat. Chiapas Collections: *21992*; *22068*; *22805*; *37288*; *40331* pt.; *G 304* (PH), *305* (NY); *GM 6* (DS, NY); *L&S 9888* (US).

Although the general habit and dark streaking of the rhizome scales are similar to those of *E. affine* and *E. alan-smithii,* this species can be distinguished by its narrow blade and generally shorter rhizome length. See comments under those species.

32. **Elaphoglossum vestitum** (Schlecht. & Cham.) Schott ex Moore, Ind. Fil. 369. 1862.

—*Acrostichum vestitum* Schlecht. & Cham., Linnaea 5:605. 1830. —Type: Mexico, Veracruz, "prope Jalapam. Aug.," *Schiede s.n.* (B!). (Although there is no type specimen number cited with the description, there is a specimen at B (*Schiede 766*) with all the pertinent data of locality and date on it. There is also *Schiede 735* but without data, so the former is presumed to be the type specimen.)
Acrostichum fulvum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):24, pl. 3, fig. 2. 1842. —Type: Mexico, Veracruz, Orizaba, *Galeotti 6459* (BR!).
Illustration: apparently none of merit.

Rhizome short-creeping, ca. 5 mm diam.; rhizome scales castaneous, lustrous, linear-lanceolate, toothed, 4–6 mm long; phyllopodia distinct, short; fronds clumped, 25–60 cm long, 1.4–3.1 cm broad; stipe ⅛–⅖ frond length; stipe scales linear, tan, ca. 2 mm long, ciliolate, spreading, others smaller, stellate; blade narrowly elliptic, apex caudate, base narrowly cuneate; veins evident to obscure, free, simple to once-forked, ca. 1 mm apart, running at ca. 70° angle; hydathodes lacking; blade scales orange, linear, very long-ciliolate, plane or spreading, loosely covering lower surface, adaxial surface glabrous with age, with narrowly lanceolate scales with long hair-teeth or substellate with long teeth; fertile fronds slightly shorter or longer than the sterile fronds; stipe ⅓–½ fertile frond length; a few reduced scales on abaxial midvein but not among the sporangia; spores with low, broad, smooth ridges.

Epiphytic, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; frequent in Northern Highlands, rare in se Central Plateau and n Sierra Madre; 700–1700 m. Southern Mex. (Oax., Ver.). Chiapas Collections: *21643*; *21846*; *22474*; *25118*; *28922*; *31514*; *32509*; *32701*; *37045*; *38979*.

Elaphoglossum auricomum is closely related but is distinguished by having large, lanceolate, spreading scales on the stipe and abaxial midvein, and lighter-colored rhizome scales. See comments under *E. rubescens* for more details.

Uncertain Species

Elaphoglossum trichomallum (Rov.) C. Chr., Ind. Fil., Suppl. I, 43. 1913. —*Acrostichum trichomallum* Rov., Pterid. Sur Mex. 252. 1909. —Type: Mexico, Chiapas, "ad ripam fluminis Lacanja," *Martinez s.n.* [1101]. No material of this species has been found.

41. ERIOSORUS

Eriosorus Fée, Gen. Fil. 152, pl. 13B, fig. 1. 1852. —Type: *Eriosorus scandens* Fée =*E. aureonitens* (Hook.) Copel.

Plants terrestrial; rhizome repent, usually with short, compact internodes, densely clothed with golden-brown to black, spreading or appressed trichomes, or bristles up to 10 cells wide at base, rarely scales; fronds usually erect, sometimes scrambling or scandent; stipe and rachis atropurpureous or castaneous, rarely tan, usually pubescent or glandular, rachis sometimes fractiflex; pinnae more or less pubescent or glandular, especially on abaxial surface, trichomes mostly uniseriate and multicellular; ultimate segments usually bifid, or orbicular to ovate; veins free, dichotomous; sporangia along veins, most abundant on penultimate veins and at base of ultimate veins; spores tetrahedral, dark brown to tan, proximal face with prominent ridges or tubercules adjacent to the triradiate scar, with a moderate to broad equatorial flange, distal face with three ridges forming a triangle; gametophytes spathulate with a lateral meristem; $x = 87$ (from $x = 29$?).

A Neotropical genus of 25 species, found mostly in cool, moist highlands, from southern Mexico and the West Indies to central Bolivia and southeastern Brazil and Uruguay; also Tristan da Cunha Islands (Tryon, 1970). Centers of distribution are southeastern Brazil, the Andes, and Costa Rica. According to Tryon (1970), *Eriosorus* is most closely related to *Jamesonia* and even hybridizes with that genus.

Reference: Tryon, A. F. 1970. A monograph of the fern genus *Eriosorus*. Contr. Gray Herb. 200:54–174.

Fronds scandent, twining or scrambling, to 3 m long (specimens often incomplete), 4 or more times pinnate .... 1. *E. flexuosus* var. *flexuosus*

Fronds erect (ours), or if scandent or scrambling 1–3 times pinnate; blades of mature leaves mostly between 5–50 cm long, usually not exceeding 70 cm .... 2. *E. hirtus* var. *hirtus*

1. **Eriosorus flexuosus** (H.B.K.) Copel., Gen. Fil. 58. 1947.

—*Grammitis flexuosa* H.B.K., Nov. Gen. et Sp. 1:4 (Fol. ed.), 1816; 1:5 (4° ed.), 1816. —*Psilogramme flexuosa* (H.B.K.) Kuhn, Fests. 50 Jub. Reals. Berlin 339. 1882. —TYPE: Venezuela, near Caracas, *Humboldt & Bonpland s.n.* (Herb. Kunth ex Herb. Humboldt, B, photo GH; isotypes P).

Gymnogramma flexuosa Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:306. 1811. —TYPE: "America equinoctali" [specimen], collector not stated, Herb. Desvaux (P! photo GH).

Gymnogramma refracta Kunze ex Klotzsch, Linnaea 20:410. 1847. —*Psilogramme refracta* (Kunze ex Klotzsch) Maxon, Bull. Torrey Bot. Club 42:85. 1915. —TYPE: Venezuela, Sierra Nevada, *Moritz 359* (B; isotypes B, BM; fragm. F, US).

For additional synonymy, see Tryon (1970:159).

ILLUSTRATIONS: Greville & Hooker, Bot. Misc. 3:pl. 112. 1833 [as *Cryptogramma retrofracta* Grev. & Hook.]; Tryon (1970:156, fig. 33A).

Fronds scrambling or scandent, elongate, pinnae oriented in several planes, central ones longer than those at apex or base; rachis glabrous or slightly pubescent; pinnae ascending and spreading, not appressed to rachis, herbaceous, often rigid, with sparse trichomes on both surfaces or glabrous above; ultimate segments dichotomously lobed to deeply bifid, slender, usually with 1 vein; pinnule rachises fractiflex, usually ascending at an angle with pinna rachis of less than 90 degrees; spores tan or light brown; $n = 87$ (C.R.).

Steep slopes in Evergreen Cloud Forest; uncommon in s Sierra Madre; 2800–3000 m. Southern Mex. (Oax.), Guat., Salv., Nic., C.R.; S.A. (Col. to Bol., s Braz.); Hisp. [var. *galeanus* A. F. Tryon is known only from Gro.]. CHIAPAS COLLECTIONS: *EM 5241* (F, GH, MEXU, US, only the last two seen); *22797*; *31795*.

2. **Eriosorus hirtus** (H.B.K.) Copel. var. **hirtus**, Gen. Fil. 58. 1947.

—*Grammitis hirta* H.B.K., Nov. Gen. et Sp. 1:4 (Fol. ed.). 1816. —*Gymnogramma hirta* (H.B.K.) Kaulf., Enum. Fil. 72. 1824. —*Psilogramme hirta* (H.B.K.) Kuhn, Fests. 50 Jub. Reals. Berlin 338. 1882. —TYPE: Venezuela, Silla de Caracas, *Humboldt & Bonpland s.n.* (P, photo GH; isotype B).

Psilogramme chiapensis Maxon, Bull. Torrey Bot. Club 42:81. 1915. —TYPE: Mexico, Chiapas, Cerro del Boquerón, *Purpus 6722* (US! isotypes BM, F, GH, HBG, P, UC! US!).

ILLUSTRATIONS: **Fig. 41**; Tryon (1970:105, fig. 14A).

Fronds erect, 10–67 cm long; blade elongate-triangular to deltoid, basal pinnae longest, usually 3–4-pinnate, 4.5–45.0 cm long, 2.5–22.0 cm wide, determinate; rachis straight, rarely subflexuose; pinnae slightly ascending, elongate-triangular or deltoid, basiscopic side usually larger, 1.5–20.0 cm long, 1–11 cm wide; upper surface moderately to densely pubescent, trichomes clear or tan, apical cell elongate; lower surface moderately to densely pubescent, trichomes similar to those on upper surface; ultimate segments cuneate, often with bifid lobes, margin retuse or more strongly cleft; veins terminating at or rarely short of margin; spores tan or light brown; $n = 174$ (Chis.).

Steep slopes in Montane Rain Forest, Evergreen Cloud Forest; s Sierra Madre; 2000–2600 m. Southern Mex. (Chis. only), Guat., Hond.; S.A. (Ven., Bol.); Cuba [var. *glandulosus* (Karst.) A. F. Tryon is known from Col., Ecu., Bol.]. CHIAPAS COLLECTIONS: *P 7219* (UC, US); *X&S X-470* (US, not seen); *P 6722* (BM, F, GH, HBG, P, UC, US, only the last two seen); *31948*; *42747*.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Eriosorus hispidulus (Kunze) Vareschi var. *hispidulus* —Reported by Tryon (1970) from Guatemala (Dept. Chiquimula), Puerto Rico, and South America. It can be distinguished from *E. hirtus,* its closest relative, by the more lanceolate but less dissected pinnae, by the equilateral pinnae, and by the veins terminating short of the margin.

42. GRAMMITIS

Grammitis Swartz, J. Bot. (Schrader) 1800(2):17. "1801" [1802]. —LECTOTYPE (chosen by Christensen, Ind. Fil. xliv. 1906): *Polypodium marginellum* Swartz [≡*Grammitis marginella* (Swartz) Swartz].

Ctenopteris Kunze, Bot. Zeitung (Berlin) 1846:425. —LECTOTYPE (chosen by Copeland, Gen. Fil. 218. 1947): *Polypodium venulosum* Blume [≡*Ctenopteris venulosa* (Blume) Kunze]. For a discussion of typification, see Morton, Amer. Fern J. 56:65–68. 1966.

Plants mostly epiphytic, occasionally terrestrial or saxicolous at high elevations; rhizome erect to creeping, solenostelic to dictyostelic, most species bearing scales; fronds mostly small, with wiry or filamentous, non-articulate stipe usually less than 1 mm diam.; blade entire to pinnatifid to often pinnatisect to pinnate or more dissected in a few species; hydathodes present or absent (most of our species); stipe, rachis, and often leaf tissue bearing stiff, patent, unicellular bristles, often reddish or darker (tan in some species), often 1 mm or more long; veins simple or forked, typically not anastomosing; sori round to elongate, usually discrete, without indusia; sporangia glabrous or sometimes setose, with stalks 1 cell thick at base; spores globose-tetrahedral, without perispore, green (at least when fresh); gametophytes filamentous; $n = 37, 36, 33$.

Pantropical, with perhaps 400 species (using the figures of Copeland, 1947). The number of New World species is large, perhaps 200. Copeland (1952; 1955) recognized 127 species of *Ctenopteris* (treated here as sect. *Cryptosorus*) and 34 species of *Xiphopteris* (the type of which is now regarded as a species of *Cochlidium*) for the New World; the number of species of *Grammitis* s.s. is relatively small. Morton (1967; 1971) recognized 56 species of *Grammitis* s.l. from Ecuador; Proctor (Bull.

Inst. Jamaica, Sci. Ser. 5:1–89. 1953) recorded 41 species from Jamaica, about 31 of which are not found in Ecuador. In Chiapas, there are 23 species so far known with several others to be expected, especially in the southeastern Central Plateau and the Eastern Highlands near the Guatemala border. Most of the species occurring in Chiapas have distributions extending into Central and even South America; a few have Antillean affinities.

All species of *Grammitis* in Chiapas occur within dense Montane Rain Forests or Evergreen Cloud Forests; grammitids are apparently not able to tolerate seasonal drying.

REFERENCES: COPELAND, E. B. 1955 [1956]. *Ctenopteris* in America. Philipp. J. Sci. 84:381–473; 1952. The American species of *Xiphopteris*. Amer. Fern J. 42:41–52; 92–110; MAXON, W. R. 1914. Contr. U.S. Natl. Herb. 17:398–406; 17:542–557; MORTON, C. V. 1967. The genus *Grammitis* in Ecuador. Contr. U.S. Natl. Herb. 38:85–123; supplement in Phytologia 22:71–82. 1971.

- a. Blade entire or slightly repand (sect. *Grammitastrum* Fourn.).
  - b. Blade margin entire, 2–4 mm wide .... 12. *G. jungermannioides*
  - bb. Blade margin undulate, ca. 15 mm wide .... 10. *G. harrisii*
- aa. Blade lobed to pinnatisect.
  - c. Veins in segments simple or forked [sect. *Xiphopteris* (Kaulf.) Presl, sensu Morton, 1968].
    - d. Fertile part of blade differentiated from sterile; veins simple.
      - e. Blade sharply serrulate in lower half; rhizome somewhat elongate; rhizome scales tan, concolorous, appressed, ca. 0.5 mm long, entire .... *Cochlidium serrulatum*
      - ee. Blade with spatulate segments in lower half; rhizome not elongate; rhizome scales not appressed, brownish, clathrate, with an apical seta .... 18. *G. myosuroides*
    - dd. Fertile part of blade not differentiated.
      - f. Blade glabrous; veins simple .... 8. *G. delitescens*
      - ff. Blade setose; veins forked, at least in fertile segments.
        - g. Segments conspicuously gibbous (with a slight hump or lobe on acroscopic margin); rhizome scales golden, glabrous.................... 22. *G. trichomanoides*
        - gg. Segments oblong, not or only slightly gibbous.
          - h. Rhizome scales golden but castaneous toward tip, with castaneous cilia; lower segments not strongly decurrent .... 5. *G. blepharodes*
          - hh. Rhizome scales golden, without cilia; lower segments strongly decurrent .... 4. *G. basiattenuata*
  - cc. Veins pinnate in segments [sect. *Cryptosorus* (Fée) Fourn.].
    - i. Sporangia pilose or setose; leaf surface, or at least segment margins, softly long-hairy; rhizome scales ciliate (scales absent in *G. mollissima*).
      - j. Blade frequently forking, indeterminate.................... 11. *G. heteromorpha*
      - jj. Blade not forking, determinate or indeterminate.
        - k. Rhizome scales absent, replaced by long, tan hairs at apex; sporangial hairs ca. 0.3 mm long .... 16. *G. mollissima*
        - kk. Rhizome scales present, these setulose.
          - l. Stipe absent or nearly so; blade fully pinnate most its length; sporangial hairs 0.5–1.0 mm long; fronds pendent .... 6. *G. cultrata*
          - ll. Stipe evident; blade merely deeply pinnatisect; sporangial hairs 0.2–0.3 mm long; fronds arching .... 3. *G. asplenifolia*
    - ii. Sporangia glabrous; leaf surface usually without hairs; rhizome scales glabrous (except *G. margaritata*, *G. semihirsuta*).
      - m. Blade (at least some) 1–2-forked; leaf surface soft-hairy, thin .... 11. *G. heteromorpha*
      - mm. Blade not forked; leaf surface not soft-hairy.
        - n. Leaf tissue relatively thin, densely viscid-glandular on both sides .... 7. *G. delicatula*
        - nn. Leaf tissue thin to thick, not viscid-glandular.
          - o. Leaf tissue on upper surface with conspicuous whitish lime-dots.
            - p. Fronds large, mostly greater than 25 cm long; rachis and costae below with black, clavate, fungal fruiting bodies; stipe to 15 cm long .... 20. *G. semihirsuta*
            - pp. Fronds mostly less than 10 cm long; axes below lacking fungal fruiting bodies; stipe absent to shorter than 1 cm .... 21. *G. subtilis*
          - oo. Leaf tissue on upper surface lacking white lime-dots.
            - q. Rhizome scales setulose; stipe evident, one-third to about equaling blade length.
              - r. Whitish glands mixed with sporangia; stipe with dark hairs to ca. 3.5 mm long; blade pinnatisect, not or only slightly reduced at base .... 14. *G. margaritata*
              - rr. Whitish glands absent among sporangia; stipe densely hispidulous with whitish hairs 0.1–0.2 mm long; blade fully pinnate in lower third, lowermost segments greatly reduced .... 2. *G. apiculata*

qq. Rhizome scales glabrous; stipe absent to less than one-third blade length; glands lacking in sori.
  s. Rachis and sometimes costae below bearing black, clavate, fungal fruiting bodies ca. 1 mm long; plants spreading by delicate rootlike stolons .... 1. *G. anfractuosa*
  ss. Axes below lacking fungal fruiting bodies; rhizome short- to long-creeping, plants not stoloniferous.
    t. Pinnae less than twice as long as wide.
      u. Rhizome long-creeping; stipe usually distinct; plants aromatic when dried; high elevation (2300–3600 m) .... 17. *G. moniliformis*
      uu. Rhizome short-creeping; blade reduced to rhizome or nearly so; plants not aromatic when dried; low elevation (800 m) .... 15. *G. melanosticta*
    tt. Pinnae greater than twice as long as wide, at least the longest ones.
      v. Segments ascending, acutish at tip; leaf tissue thin, lacking hairs among sporangia .... 13. *G. leptostoma*
      vv. Segments patent to ascending, rounded to acute at tip; leaf tissue chartaceous to subcoriaceous, with stiff reddish setae around sorus and mixed with sporangia.
        w. Blade fully pinnate for most of length; pinnae linear, largest 1.5–2.5 cm long, not dilated at their base .... 9. *G. firma*
        ww. Blade deeply pinnatifid to pinnatisect, adjacent segments contiguous; pinnae lanceolate to oblong, mostly less than 1.5 cm long, dilated at their bases.
          x. Segments patent, rounded at tip; sterile pinnae glabrous below; middle to occasionally high elevations [800–2300 (2800) m] .... 23. *G. xiphopteroides*
          xx. Segments ascending, acutish at tip; sterile pinnae long-hairy below; high elevation (2700–3600 m) .... 19. *G. pilosissima*

1. **Grammitis anfractuosa** (Kunze ex Klotzsch) Proctor, Rhodora 63:35. 1961.

—*Polypodium anfractuosum* Kunze ex Klotzsch, Linnaea 20:375. 1847. —*Ctenopteris anfractuosa* (Kunze ex Klotzsch) Copel., Philipp. J. Sci. 84:431. 1955. —TYPE: Venezuela, Merida, *Moritz 330*? (isotype US).

Polypodium saxicola Baker, J. Bot. 15:264. 1877 (not Swartz, 1817). —*Polypodium induens* Maxon, Bull. Torrey Bot. Club 32:75. 1905. —TYPE: Jamaica, Mar 1877 [*Jenman* "No. 84"] (K!).

ILLUSTRATION: **Fig. 42.**

Rhizome compact, suberect, clothed at apex with small, brownish scales; plants spreading by numerous delicate rootlike stolons; fronds caespitose, deeply pinnatisect, mostly 6–12 cm long, 1.0–1.5 cm wide in middle, gradually tapering on both sides of middle, lowermost segments reduced to semicircular auricles; stipe short, mostly less than 1 (2) cm long, ca. 0.5 mm diam., with patent castaneous hairs 1 mm long or more; rachis with similar hairs below, also with black, club-shaped, fungal fruiting bodies ca. 1 mm long; largest pinnae triangular, to ca. 8 mm long, 3 mm wide, acutish to obtuse at apex, broadly adnate at base; leaf tissue chartaceous, ± glabrous except for stiff castaneous setae 1 mm long concentrated around and in the sorus and at the segment margin; sori mostly 1–2 pairs per segment, confined to basal half of segment; sporangia glabrous.

Epiphyte in Montane Rain Forest, less often Evergreen Cloud Forest; scattered in Northern Highlands (Jitotol Ridge), Sierra Madre, E edge of Central Plateau; 1200–2300 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Peru); Antill. CHIAPAS COLLECTIONS: *GM 170* (DS, US); *T&L 41755* (DS); *25420*-A; *30159*; *31872*; *32644*; *33585*; *34598*.

Mickel (News and Views [Newsl. Amer. Fern Soc.] 9:4. 1973) commented upon the peculiar club-shaped fungal fruiting bodies that are found on specimens of *G. anfractuosa*. All Chiapas specimens bear this fungus, identified as *Acrospermum maxonii* Farlow ex Riddle (Mycologia 12:179. 1920). The presence of this fungus is an excellent diagnostic character for distinguishing *G. anfractuosa* from all other Chiapas grammitids except *G. semihirsuta,* which also bears the fungus.

2. **Grammitis apiculata** (Kunze ex Klotzsch) Seymour, Phytologia 31:176. 1975.

—*Polypodium apiculatum* Kunze ex Klotzsch, Linnaea 20:378. 1847. —*Ctenopteris apiculata* (Kunze ex Klotzsch) Copel., Philipp. J. Sci. 84:417. 1956. —SYNTYPES: British Guiana [=Guyana], *Schomburgk 1213*; Venezuela, Colonia Tovar, *Moritz 247* (presumably B).

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 190. 1969.

Rhizome short-creeping (to erect?), ca. 3–4 mm diam., not aromatic, clothed with lanceolate, dark brown, subclathrate scales with whitish marginal setae ca. 0.2 mm long; fronds to 25 cm long, with nonalate stipe to ca. 6 cm long, brownish, densely hispidulous with hairs 0.1–0.2 mm long; rachis below also hispidulous with whitish to slightly reddish hairs; blade narrowly elliptic, pinnatisect or usually fully pinnate in lower third; segments to ca. 35 pairs, with a caudate terminal segment 1–3 cm long, ca. 2 mm broad; lowermost segments gradually reduced to small lobes 1 mm long; largest segments 1.5–2.5 cm long, 3 mm broad, slightly to decidedly ascending, more decurrent than sursumcurrent, adnate their full width or more, lower ones free, separated by their width or more; costae and veins immersed; leaf tissue chartaceous, glabrous or nearly so on both sides, without lime-dots; sori round, to ca. 8 pair per segment, without glands.

Epiphytic in Pine-Oak Forest; rare in S Central Plateau; 1600 m. Southern Mex. (Chis. only), Hond., C.R.; S.A. (Col. to Guy. and Peru, S Braz.); Hisp. CHIAPAS COLLECTION: *42073*.

Similar to *G. firma* in habit but differing in the setose rhizome scales, nonaromatic rhizomes, and hispidulous stipes.

3. **Grammitis asplenifolia** (L.) Proctor, Brit. Fern Gaz. 9:76. 1962.

—*Polypodium asplenifolium* L., Sp. Pl. 2:1084. 1753. —*Ctenopteris asplenifolia* (L.) Copel., Gen. Fil. 219. 1947. —TYPE: Petiver, Pter. Amer. pl. 7, fig. 16, which is a redrawing of Plumier's Tract. Fil. Amer. pl. 102A, representing a plant from Martinique.

Polypodium laxifrons Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:204. 1849. —TYPE: Mexico [Veracruz], Mirador, *Liebmann* [Liebm. Pl. Mex. 2713, Fl. Mex. 232, 233, 234, all folio sheets] (C!). I choose Fl. Mex. 232 as lectotype. Isotypes K! US! (*Liebmann s.n.*).

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 39. 1909 [as *Polypodium suspensum*]; Vareschi, Fl. Venez. 1(2):pl. 191. 1969.

Rhizome short-creeping, densely clothed with numerous ferruginous densely setulose scales; fronds arching or pendent, mostly 25–75 cm long, stipe mostly ⅓–½ blade length, to 1 mm diam., bearing numerous, tan to castaneous, patent, thin, hairs 1.5–3.0 mm long; blade linear-lanceolate, deeply pinnatisect, lowermost pinnae not or only slightly reduced; pinnae numerous, lanceolate, acute at tip (ours), largest mostly 1.5–3.5 cm long, to 1 cm broad at dilated and broadly adnate base; rachis and pinna margins softly hairy, hairs like those of stipe; leaf tissue thin, chartaceous, ± glabrous or with a few hairs near sori; sori round, to ca. 12 pairs per pinna; sporangia bearing several short (0.2–0.3 mm long) tan setae from the capsule; $n = 37$, $2n = 72$? (Jam.).

Epiphyte, nearly always (always ?) on tree fern trunks, in Montane and Lower Montane rain forests, infrequently Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; common in Northern Highlands, uncommon in N Sierra Madre, Eastern Highlands, Central Plateau; 900–1700 (2300) m. Southern Mex. (Oax., Ver., Mich., Gro.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. to Ecu.); Antill., Trin. CHIAPAS COLLECTIONS: *Dr 1602* (MEXU, US); *G 420* (BM); *G s.n.* (K); *R 973* (PH); *GM 173* (DS, US); *25138*; *26068*; *29731*; *30914*; *31534*; *32192*; *32415*; *32600*; *33680*.

A closely related species is *G. lehmanniana* (Hieron.) Morton, known from Guatemala to South America. It supposedly differs in having larger segments, more numerous veinlets, and perhaps denser pubescence, but I am not convinced that these differences are significant.

The name *Polypodium suspensum* L. has often been misapplied to this species (see Morton, Contr. U.S. Natl. Herb. 38:58. 1967).

4. **Grammitis basiattenuata** (Jenm.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:32. 1953.

—*Polypodium basiattenuatum* Jenm., Bull. Bot. Dept. (2) 4:114. 1897. —*Xiphopteris basiattenuata* (Jenm.) Copel., Amer. Fern J. 42:104. 1952. —TYPE: Jamaica, "Blue Mountain Peak," *W. Harris 7475* (K!).

ILLUSTRATION: Maxon (1916:pl. 36).

Rhizome suberect, bearing tan to golden, lanceolate, glabrous scales ca. 2 mm long, 0.5 mm broad; fronds arching, mostly 6–12 cm long, 0.6–0.8 cm broad, with stipe lacking to ca. 3 cm long and narrowly winged; blade attenuate below, pinnae increasingly decurrent, distant and oblique proximally; largest segments oblong, contiguous, oblique (ca. 60° to rachis), decurrent, confluent, not gibbous, 2.0–3.5 mm broad, rounded at tip; costae below hidden, with a single anterior veinlet on fertile segments; leaf tissue on both sides and pinna margin with stiff reddish bristles ca. 2 mm long; sori round, relatively large, one per segment at base of anterior veinlet; sporangia glabrous.

Epiphyte in Evergreen Cloud Forest; two collections from a single locality in cen. Sierra Madre (Cerro Tres Picos); 2100–2500 m. Otherwise known only from Jamaica. CHIAPAS COLLECTIONS: *25421*, pt.; *30160*.

Grammitis basiattenuata was thought heretofore to be endemic to Jamaica. Chiapas specimens may differ slightly from Jamaican ones in having segments slightly more oblique but agree in all other characters. I am convinced that Chiapas collections, if not conspecific, are the closest relative to Jamaican *G. basiattenuata*. Other relatives are *G. trichomanoides*, which has gibbous, horizontal segments, and *G. setulosa* and *G. truncicola*, which have setose rhizome scales. Specimens of *G. setulosa* from Oax., Guat., Nic., C.R. are very much like Chiapas specimens of *G. basiattenuata*.

5. **Grammitis blepharodes** (Maxon) Seymour, Phytologia 31:173. 1975 (June).

—*Polypodium blepharodes* Maxon, Contr. U.S. Natl. Herb. 17:407. 1914. —*Xiphopteris blepharodes* (Maxon) Copel., Amer. Fern J. 42:109. 1952. —TYPE: Costa Rica, La Palma, *Maxon 406* (US).

ILLUSTRATION: **Fig. 42.**

Rhizome erect, bearing thick, lanceolate, ciliate scales ca. 1.5 mm long, 0.6 mm wide, scales tan but castaneous toward tip, especially along margin, cilia ca. 0.3 mm long, castaneous; fronds tightly fasciculate, arching, mostly 7–20 cm long, 0.6–0.8 cm broad, with short stipe mostly 0.5–2 mm long, 0.3 mm diam., stipe with spreading, dense, reddish bristles 1–2 mm long; blade linear, pinnatisect, lowermost several pairs of pinnae reduced; pinnae to ca. 70 pairs, mostly contiguous, oblong, ca. 1.5–2.0 mm broad, rounded at apex, anterior margin sometimes with an obscure hump, more often straight; costae not easily visible below, with a single anterior veinlet; leaf tissue thick-herbaceous, on both sides with stiff, reddish bristles 1–2 mm long; sori one per pinna, located on anterior veinlet; sporangia glabrous.

Epiphytic, in Montane and Lower Montane rain forests, Pine-Oak Forest, Pine-Oak-Liquidambar Forest; rare, known from essentially two localities, Northern Highlands (13 km N of Berriozabal), and SE Central Plateau (vicinity of Montebello) 900–1600 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Ven., Ecu.). CHIAPAS COLLECTIONS: *30809*; *31531*; *32119*; *32225*, pt.; *35222*; *38855*; *38887*; *38906*; *42074*.

6. **Grammitis cultrata** (Willd.) Proctor, Rhodora 63:35. 1961.

—*Polypodium cultratum* Willd., L. Sp. Pl., ed. 4, 5:187. 1810. —*Ctenopteris cultrata* (Willd.) Copel., Gen. Fil. 219. 1947. —TYPE: presumably Jamaica, *Swartz s.n.* (B—Herb. Willd. 19674, photo US).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(2):pl. 178. 1969; Ettingshausen, Farnkr. pl. 14, figs. 3–4. "1865" [1864].

Rhizome very short-creeping to suberect, with numerous lanceolate, ferruginous, setulose scales (setae lighter colored than body of scale); fronds pendent, linear, ± indeterminate, mostly 12–40 cm long, 1.5–4 cm broad, with very short, long-hairy stipe less than 2 cm long (ours), 0.5 mm diam.; blade deeply pinnatisect to fully pinnate most of length, gradually narrowed on both sides of middle; pinnae often 50 or more pairs, the largest lanceolate-oblong, rounded to subacute at apex, dilate and broadly adnate at base, to ca. 8 mm wide; costae below black; leaf tissue thin-herbaceous, on both sides long-hairy, hairs mostly 1–3 mm long, soft, tan, on margins of segments often in fascicles of 2's and 3's; sori round, 1–5 pairs per segment; sporangia bearing thin, tan to whitish, capsular hairs ca. 0.5–1.0 mm long; n = 37 (C.R.).

Epiphytic on tree ferns, infrequently on banks of streams and wet rocks, in Montane Rain Forest, rarely Evergreen Cloud Forest; common in Northern Highlands (Jitotol Ridge), s Sierra Madre, widely scattered localities in the Central Plateau; 1700–2800 m. Southern Mex. (Oax., Gro.), Guat., Hond., Salv., C.R., Pan.; S.A. (Ven. and Col. to Peru); Gr. Antill. (exc. P.R.). Chiapas Collections: *GM s.n.* (DS); *GM 119* (DS, US); *EM 2912* (K, MEXU, US); *EM S-229* (K, US); *EM S-225* (K, NY); *P 7229* (UC, US); *19946*; *21477*; *21501*; *29971*; *31684*; *31874*; *32416*; *33641*; *33681*.

The Münch collections, from Zontehuitz, differ from other Chiapas collections in having the pinnae more widely separated, contracted at the base, and in having narrower fronds. In these characters, these collections approach *G. senilis* (Fée) Morton, known from Guatemala, Costa Rica, and northern South America.

7. **Grammitis delicatula** (Mart. & Gal.) Proctor, Brit. Fern Gaz. 9:219. 1965.

—*Polypodium delicatulum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):35, pt. 7, fig. 1. 1842. —*Ctenopteris delicatula* (Mart. & Gal.) J. Smith, Bot. Voy. Herald 227. 1854. —Type: Mexico, Oaxaca, Llano Verde, *Galeotti 6378* [text] (holotype BR!, numbered "6328"; isotypes BR—2 sheets, numbered 6378, K, fragm. US).

Illustration: none found that are accurate.

Rhizome compact, very short-creeping, apex with small, closely appressed, glabrous (ours), yellowish-brown scales 1–1.5 mm long, 0.6–0.8 mm broad; fronds pendent or arching, mostly 4–15 (20) cm long, 0.8–2.0 cm broad, with delicate stipes mostly 1–2 cm long, ca. 0.3 mm diam.; blade deeply pinnatisect to fully pinnate, several pairs of lowermost pinnae reduced, medial pinnae longest, linear-oblong, entire or slightly undulate, ca. 1.5–2.0 (2.5) mm wide, subacute at apex, separated by less than their width, ascending (60–80° from rachis); rachis below and leaf tissue on both sides with stiff reddish hairs ca. 1 mm long, hairs especially prominent at pinna margins, occasional specimens nearly lacking reddish trichomes; leaf tissue chartaceous, on both sides viscid-glandular, the glands ca. 0.1 mm long, hyaline to yellowish; sori up to ca. 5 pairs per pinna, round; sporangia glabrous.

Epiphytic (infrequently on rocks) in Evergreen Cloud Forest; Sierra Madre, higher peaks of Central Plateau; 2500–3000 m. Southern Mex. (Oax., Hgo.), Guat.; Jam. Chiapas Collections: *G 318* (K); *EM 2379* (US); *22767*; *22817*; *22927*; *25422*; *30157*; *32043*; *40450*.

Maxon (Proc. Biol. Soc. Wash. 52:117. 1939) gave a complete description of this rather rare species; Chiapas specimens are in accord with this description except that the rhizome scales are glabrous rather than ciliate.

8. **Grammitis delitescens** (Maxon) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:32. 1953.

—*Polypodium delitescens* Maxon, Bull. Torrey Bot. Club 32:74. 1905. —*Xiphopteris delitescens* (Maxon) Copel., Amer. Fern J. 42:51. 1952. —Type: based on *Grammitis myosuroides* sensu Schkuhr, Krypt. Gewächse 1:9, pl. 7, 1804, which describes and illustrates a plant probably received from Swartz and from Jamaica.

Illustration: Maxon (1914:404, also pl. 12).

Similar to *G. myosuroides* but rhizome scales lacking apical setae; blade not differentiated into fertile and sterile parts, pinnatifid throughout, or if differentiated, then the transition more gradual and fertile portion serrate rather than serrulate (dimorphism not so obvious); segments rounded to subacute, deltoid, approximate (never remote and spatulate); sori distinct, not entirely confluent with age; n = ca. 132–138 I (Jam.).

Epiphytic, in Montane and Lower Montane rain forests, Pine-Oak-Liquidambar Forest; known from essentially two localities, 13 km N of Berriozabal (Northern Highlands) and vicinity of Lago Tziscao (SE Central Plateau); 900–1300 m. Southern Mex. (Oax., Pue., Hgo.), Guat., Hond., Nic.; S.A. (Col.?); Jam., Cuba. Chiapas Collections: *22380*; *30808*; *31532*; *32231*; *35225*; *38823*.

Several collections seem to vary in the direction of *G. myosuroides* (e.g., *32231, 38823*), and I am not completely convinced that the differences listed above will adequately distinguish between specimens of the two species from southern Mexico. Other collections of *G. delitescens* (e.g., *30808, 31532, 35225*) approach very closely *Grammitis limula* (Christ) L. D. Gómez from Costa Rica, Panama, and Guatemala. These two species are so close that Copeland (1952), perhaps rightly, united them. *Grammitis limula* apparently has smaller, ovate, appressed rhizome scales and more coriaceous blades. Additional study is needed to define their differences.

9. **Grammitis firma** (J. Smith) Morton, Contr. U.S. Natl. Herb. 38:110. 1967.

—*Polypodium firmum* Klotzsch, Linnaea 20:378. 1847 (not Kaulf., 1827). —*Ctenopteris firma* J. Smith, Hist. Fil. 184. 1875. —Lectotype [inferentially chosen by Looser, Revista Univ. (Santiago) 36(1):75. 1951]: British Guiana [=Guyana], *Schomburgk 1170* (isolectotype K!). *Polypodium aromaticum* Maxon, Proc. U.S. Natl. Mus. 27:743. 1904. —*Ctenopteris aromatica* (Maxon) Copel., Philipp. J. Sci. 84:418. 1955. —*Grammitis aromatica* (Maxon) Proctor, Brit. Fern Gaz. 9:218. 1965. —Type: Jamaica, Blue Mt. Peak, *Underwood 1449* (NY; fragm. US).

Illustration: none found.

Rhizome elongate, aromatic, apparently erect or suberect, densely clothed with lanceolate, brown, clathrate, glabrous scales to ca. 5 mm long, 0.5 mm wide; fronds mostly 12–22 cm long, 5 cm broad, with stipe to ca. 5 cm long, 1 mm diam.; blade fully pinnate for most of length, broadest at the middle or slightly above middle, tapering below through a long series of gradually reduced pinnae, above to a caudate apex 2–3 cm long; pinnae linear, ca. 30–35 pairs, the largest 2–3 mm wide, obtuse to subacute at tip, often falcate, slightly excised at the inferior base, sursumcurrent acroscopically, pinnae in lower third of blade separated by their width or more; costae and rachis below blackish, with scattered reddish bristles 0.5–1.0

mm long, lacking fungal fruiting bodies; leaf tissue chartaceous to subcoriaceous, glabrous above and below except for a few reddish bristles around and in the sori, without lime-dots above; sori round, to ca. 15 pairs per segment; sporangia glabrous.

Epiphyte in Montane Rain Forest, Evergreen Cloud Forest, less often Pine-Oak-Liquidambar Forest; widely scattered in s half of Sierra Madre, Central Plateau, Northern Highlands (Jitotol Ridge); 1700–2300 m. Southern Mex. (Chis. only), Guat., C.R.; S.A. (Col., Ven., Peru, Bol.); Jam. Chiapas Collections: *GM 101a*, pt. (DS); *22657*; *25420*, pt.; *28212*, pt.; *29970*, pt.; *30093*; *30158*; *32642*; *33665*.

10. **Grammitis harrisii** (Jenm.) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:230. 1975.

—*Polypodium harrisii* Jenm., Gard. Chron. (3)27:241. 1900. —Type: Jamaica, Mabess River, *Harris 7729* (K!).

Illustration: Christensen, Kongl. Svenska Vetenskapsakad. Handl. (3) 16:pl. 16, figs. 7–9. 1937.

Fronds pendent from a compact rhizome; rhizome scales golden to tannish with orangish glandular marginal hairs; fronds to ca. 22 cm long, 1.5 cm broad; stipe to 7 cm long, 0.6 mm diam., with numerous, spreading, castaneous hairs to 2.5 mm long; blade narrowly cuneate at base, with sinuate lateral margins, fleshy, with scattered, ferruginous, appressed hairs on leaf tissue (both sides) and margin, hairs to 2.5 mm long; veins (including midrib) immersed, not easily visible; sori in two or more irregular series on each side of midrib, partially immersed, oval to linear, to ca. 3 mm long, intermixed with orangish, glandular, linear paraphyses.

Epiphyte in Montane Rain Forest; apparently rare in Eastern Highlands (Laguna Ocotal Grande); 2500 m. Otherwise known from Bel., Bel.-Guat. boundary; Jam., Hisp. (see Weatherby, Amer. Fern J. 25:52–59. 1935). Chiapas Collection: *Dr 1695* (MEXU, US), "high branches in selva."

Closely related to *G. percrassa* (Baker) Seymour, with which Seymour (Phytologia 31:172. 1975) combined it. *Grammitis percrassa* is known from Nicaragua, Costa Rica, and Panama. Another close relative is *G. insidiosa* (Slosson) Proctor, known from Cuba and Jamaica; it differs in having the sori mostly round.

11. **Grammitis heteromorpha** (Hook. & Grev.) Morton, Contr. U.S. Natl. Herb. 38:102. 1967.

—*Polypodium heteromorphum* Hook. & Grev., Icon. Fil. 1:pl. 108. 1829. —*Ctenopteris heteromorpha* (Hook. & Grev.) Copel., Philipp. J. Sci. 84:412. 1955. —Type: Ecuador, Mt. Pichincha, *Jameson s.n.* (K!— 2 sheets?; possible isotypes P!).

Illustration: Matuda, Anales Inst. Biol. Univ. Nac. México 27:151. 1956.

Rhizome very short-creeping to suberect, with numerous scales, these ferruginous, densely ciliate and hairy on surface; fronds numerous, fasciculate, ± pendent, linear, ± indeterminate, 1-pinnate or often dichotomously forking 1 or more times, 30–60 (80) cm long; stipe very short (seemingly longer because older pinnae articulate), filiform, ca. 0.3 mm diam.; pinnae numerous, 50 or more pairs, alternate, the lowermost short-stalked ca. 1 mm, uppermost sessile to partially adnate, irregularly oval or obovate, rounded at apex, well spaced to often crowded or imbricate; axes and segment margins copiously long-hairy, hairs mostly 2–3 mm long, often fasciculate or joined at base, stiff, tan to castaneous; segments with a costa, this with pinnate veinlets; veinlets simple, ending in a clavate tip well back from margin; leaf tissue thin-herbaceous, ± glabrous except at margin; sporangia glabrous (ours) or pilose.

In our area known only from near the summit of Volcán Tacaná (s Sierra Madre), growing on rock faces; 3600 m. Highest peaks of s Mex. (Méx., Jal., Pue., Ver.), Guat., Salv., C.R.?; S.A. (Col., Ecu., Peru). Chiapas Collections: *EM 2890* (K, MEXU, NY, US); *24297*; *24303*; *24304*.

The Ecuadorian type, as well as much South American material, has more coriaceous segments, stouter, thicker rachises, and more strongly divergent branches. Specimens from the two areas (Mexico and South America) may prove to be taxonomically distinct.

12. **Grammitis jungermannioides** (Klotzsch) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10:240. 1941.

—*Polypodium jungermannioides* Klotzsch, Linnaea 20:373. 1847. —Type: Venezuela, Mérida, *Moritz 312* (presumably B; isotype BM!).

Illustration: none found.

Rhizome suberect, lacking scales at apex; fronds numerous, tufted, narrowly ligulate (stipe lacking), 1.5–6 (rarely 10) cm long, 2–3 (4) mm wide, entire or slightly repand; veins forked (not readily visible); leaf tissue thick-herbaceous, with numerous, spreading, castaneous hairs mostly 1.5–2.0 mm long on both sides; sori oblong (at least when young), ca. 1 mm long, 0.5 mm wide, in two rows on both sides of midrib; sporangia without hairs, copiously clad with whitish, opaque, hemispherical, sessile glands.

Epiphyte, in Chiapas known from two collections in Montane Rain Forest and *Liquidambar-Myrica-Nyssa* marsh; rare in Northern Highlands (Jitotol Ridge); 1700 m. Guat., Nic., C.R., Pan.; S.A. (Col., Ven.); Jam. Chiapas Collections: *32442*; *32645*.

For additional discussion and synonymy, see Maxon (Proc. Biol. Soc. Wash. 51:35. 1938).

13. **Grammitis leptostoma** (Fée) Seymour, Phytologia 31:179. 1975.

—*Polypodium leptostomum* Fée, Mém. Fam. Foug. 7: 58, pl. 21, fig. 2. 1857. —*Ctenopteris leptostoma* (Fée) Copel., Philipp. J. Sci. 84:421. 1955. —Type: Mexico [Veracruz], near Orizaba, *Schaffner 210* (P?—not found).

Polypodium productum Maxon, Contr. U.S. Natl. Herb. 13:11. 1909. —Type: Guatemala, Alta Verapaz, near Cobán, *v. Türckheim II. 1347*, in part (US!).

Illustration: only the original.

Rhizome short-creeping, bearing numerous lanceolate, clathrate, iridescent, entire scales 3–3.5 mm long; fronds linear-attenuate, mostly 12–25 (32) cm long, 12–20 mm wide, with short stipe mostly 1–4 cm long, 0.5 mm diam.; blades pinnatisect nearly or quite to rachis, if fully pinnate then pinnae fully adnate; pinnae numerous (to 100 or more pairs), ascending (ca. 45–60° from rachis), linear-oblong, mostly acutish at tip with a slightly recurved margin, 3–4 lowermost pairs gradually reduced to deltoid auricles; middle pinnae to ca. 12 mm long, 2 mm broad, spaced their own width; veins pinnate, to ca. 6 pairs, ending in a clavate hydathode as viewed from above; rachis with scattered castaneous hairs mostly less than 1 mm long below, above with more numerous but shorter hairs 0.2–0.3 mm long; leaf tissue on both sides ± glabrous; sori round, medial; sporangia glabrous.

Epiphytic in Montane Rain Forest; in Chiapas, known from numerous collections all from the vicinity of Lagos de Monte Bello (SE corner of Central Plateau); 1300–1600 m. Southern Mex. (Ver., Oax.), Guat. CHIAPAS COLLECTIONS: *H&S 20426*, pt. (US); *21214*, pt.; *29625*; *32228*; *35241*; *38830*; *38885a*; *38976a*; *42067a*.

14. **Grammitis margaritata** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:221, fig. 5, D–E. 1975.

—TYPE: Mexico, Chiapas, 3–4 km W of El Porvenir, *Breedlove 31801* (*with Smith*) (DS!).

ILLUSTRATION: only the original.

Rhizome short-creeping, ca. 0.7 cm diam., bearing numerous, castaneous, narrowly lanceolate scales to ca. 5 mm long, 0.5 mm broad, scales with whitish cilia 0.3 mm long; fronds ca. 25 cm long, with stipe ca. 14 cm long, 1 mm diam., densely hairy to glabrescent, the hairs to ca. 3.5 mm long, brownish; rachis setose on both sides; blade lanceolate, pinnatisect, 2.5 cm broad; segments ca. 20 pairs, to 1.5 cm long, 4.5 mm broad, margin slightly revolute and setose, apex rounded or barely acute, dilate and adnate at base; veins about 7 pairs per segment; leaf tissue subcoriaceous, glabrous on both sides, without lime-dots above; sori round, medial to submarginal with numerous spherical, whitish, stipitate glands intermixed; $n = 37$ (Chis.).

On mossy rock ledge, Evergreen Cloud Forest; S Sierra Madre, known from two collections, the type and *Tucker 1075* (UC) from El Salvador; 2800 m.

Apparently most closely related to *G. brunneo-viridis* (Baker ex Jenm.) Proctor, from Jamaica and Hispaniola, but that species has tan to castaneous cilia on the rhizome scales, sparsely hairy to glabrescent stipes, and tan to light orange soral glands.

15. **Grammitis melanosticta** (Kunze) Seymour, Phytologia 31:179. 1975.

—*Polypodium melanostictum* Kunze, Linnaea 9:44. 1834. —*Ctenopteris melanosticta* (Kunze) Copel., Philipp. J. Sci. 84:385. 1955. —TYPE: Peru, *Poeppig s.n.* (LZ, destroyed).

Polypodium calvum Maxon, J. Wash. Acad. Sci. 12:440. 1922. —*Ctenopteris calva* (Maxon) Copel., Philipp. J. Sci. 84:386. 1955. —TYPE: Cuba, Oriente, *León 11131* (US).

ILLUSTRATION: none found.

Rhizome short-creeping and compact to suberect, not aromatic (?), bearing yellowish-brown, lanceolate scales, these not iridescent; fronds numerous, tufted, to ca. 20 cm long, 1 cm wide, tapering gradually on both sides of middle, below nearly or quite to the rhizome or to a very short (less than 1 cm), winged stipe; blade deeply pinnatisect, larger segments oblong, rounded at tip, broadly adnate at base, to ca. 6 mm long, 4 mm broad; rachis on both sides essentially glabrous, blackish below, lacking club-shaped blackish fungal fruiting bodies; leaf tissue on both sides glabrous, relatively thick, subcoriaceous; sori round, mostly 2–4 pairs per segment on both sides of costa; sporangia glabrous.

Epiphyte in Montane Rain Forest; known in Chiapas from 3 collections, all from the vicinity of Laguna Ocotal Grande (Eastern Highlands); 800 m. Southern Mex. (Chis. only), Guat., C.R.; S.A. (Ven. and Col. to Bol.?); Cuba, Hisp. CHIAPAS COLLECTIONS: *29900*, pt.; *29902*; *33014*.

I tentatively place *Polypodium calvum* in synonymy; Chiapas specimens exactly agree with several Cuban specimens that I have seen. *Grammitis melanosticta* is apparently a fairly rare species in North America, clearly of the group of *G. moniliformis* but certainly distinct.

16. **Grammitis mollissima** (Fée) Proctor, Rhodora 63:35. 1961.

—*Polypodium mollissimum* Fée, Mém. Fam. Foug. 11:47, pl. 12, fig. 2. 1866. —*Ctenopteris mollissima* (Fée) Copel., Philipp. J. Sci. 84:423. 1955. —TYPE: Guadeloupe, 1861, *L'Herminier s.n.* (presumably P, not found; probable isotype K! fragm. US).

ILLUSTRATION: only the original.

Rhizome compact, suberect, lacking scales but bearing dense, numerous, soft, tan to ferruginous hairs 1.0–1.5 mm long; fronds caespitose, arching or pendent, mostly less than 15 (45) cm long, 0.7–1.5 (2.5) cm broad, with filamentous stipe less than 1 (2) cm long and 0.3 mm diam.; blade deeply pinnatisect to fully pinnate below, tapering on both sides of middle, below with pinnae reduced nearly to rhizome; pinnae numerous, mostly ovate-oblong, rounded to subacute at tip, adnate and sometimes decurrent at base; veins 3–6 pairs, simple; rachis and leaf tissue on both sides bearing soft, tan hairs like those of rhizome; costae concealed; lime-dots absent above; sori round, 1–4 pairs on both sides of costa, borne mostly in apical half of segment; sporangia with short (ca. 0.3 mm), fine, tan, capsular setae.

Epiphytic or epipetric on wet limestone rocks, Montane Rain Forest, Pine-Oak-Liquidambar Forest; Northern and Eastern highlands (vicinity of Laguna Ocotal Grande); 800–1350 m. Southern Mex. (Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; Antill. CHIAPAS COLLECTIONS: *Dr 1622* (GH, not seen); *G 318* (GH, not seen, cited by Weatherby, Amer. Fern J. 25:58. 1935); *29871*; *32521*; *33033*.

Close relatives are *G. cultrata* and *G. senilis* (Fée) Morton, but both of these have rhizome scales; also related is *G. alfarii* (Donn.-Smith) Morton, which lacks rhizome scales but has segments with a conspicuous hump along the upper margin.

17. **Grammitis moniliformis** (Lagasca ex Swartz) Proctor, Brit. Fern Gaz. 9:219. 1965.

—*Polypodium moniliforme* Lagasca ex Swartz, Syn. Fil. 33. 1806. —*Ctenopteris moniliformis* (Lagasca ex Swartz) J. Smith, Hist. Fil. 184. 1875. —TYPE: Peru, collector not stated [*Ruiz & Pavon*?].

Polypodium moniliforme var. *major* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:196. 1849. —SYNTYPES: Mexico, Oaxaca, Cerro el Pelado, *Liebmann* [Liebm. Pl. Mex. 2570, Fl. Mex. 185] (C!); Veracruz, Pico de Orizaba, *Liebmann* [Liebm. Pl. Mex. 2533, Fl. Mex. 183] (C!). I choose Liebm. Pl. Mex. 2533 as lectotype.

ILLUSTRATIONS: Hooker, Icon. Pl. 8: pl. 719. 1845 [as *Polypodium subcrenatum*]; Fée, Crypt. Vasc. Brés. 2:55, pl. 96, fig. 3. 1873 (as *P. angustissimum*).

Rhizome short- to often long-creeping, aromatic, densely clothed with lanceolate, clathrate, iridescent scales ca. 4 mm long, 1 mm wide; fronds mostly 8–18 cm long, abruptly truncate or more often with several pairs of gradually reduced triangular segments at base; stipe mostly 1–5 cm long, ca. 0.6 mm diam., ± glabrous or glabrescent; blade pinnatisect, with 25 or more pairs of pinnae, these nearly as wide as long (largest ca. 6 mm long), rounded at apex, broadly adnate at base; rachis blackish, glabrous on both sides or below with scattered, yellowish, glandular, multicellular (often dendroid) trichomes, lacking black, club-shaped, fungal fruiting bodies; leaf tissue thick, subcoriaceous to coriaceous, glabrous on both sides (ours); sori roundish, 1–3 pairs per pinna; sporangia without hairs or glands; n = ca. 74 (Jam.).

Terrestrial, saxicolous, or epiphytic in Evergreen Cloud Forest; highest peaks of Central Plateau, Sierra Madre; 2300–3600 m. Southern Mex. (Jal., Gro., Mlos., Oax., Méx.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Jam., Hisp. CHIAPAS COLLECTIONS: *EM 2871* (MEXU, US); *EM 2889* (MEXU); *EM 2380* (K, US); *MC 1679, 1680* (US); *7824*; *22106*; *22765*; *22929*; *24312*; *25423*, pt.; *26717*; *29382*; *30156*; *31771*; *32031*; *40337*.

18. **Grammitis myosuroides** (Swartz) Swartz, J. Bot. (Schrader) 1800(2):18. "1801" [1802].

—*Polypodium myosuroides* Swartz, Prodr. Veg. Ind. Occ. 131. 1788. —*Xiphopteris myosuroides* (Swartz) Kaulf., Enum. Fil. 85, 275. 1824. —TYPE: Jamaica, *Swartz s.n.* (S; isotype BM!).

ILLUSTRATIONS: Maxon (1914:403, also pl. 11); Vareschi, Fl. Venez. 1(2):pl. 179. 1969.

Rhizome short, erect, bearing lanceolate, brown scales 1.0–1.5 mm long, ca. 0.3 mm wide, these often with one or two apical setae, otherwise glabrous; fronds fasciculate, mostly 2.5–10 cm long, with stipe very short to absent; blade linear, sharply differentiated into sterile and fertile parts, deeply pinnatisect in lower half, serrulate to crenate in upper half, 3.0–4.5 mm wide; lowermost segments gradually reduced, decurrent, oblique (to ca. 45° angle from midrib), rounded at tip, to ca. 1 mm broad, remote (separated by their width or more), rather abruptly transitional to serrulate upper portion; rachis below with scattered short bristles ca. 0.3 mm long; costae below blackened in upper half of blade, unbranched; leaf tissue glabrous on both sides (ours) or with a few marginal bristles; sori elongate along arcuate basal portion of costa; sporangia glabrous; n = 37 (Jam.).

Epiphyte in Evergreen Cloud Forest; known only from Zontehuitz (Central Plateau); 2800 m. Southern Mex. (Oax.); Guat.?; Jam. CHIAPAS COLLECTION: *22930*.

Closely related to *G. delitescens* (which see) and *Polypodium skutchii* Maxon (Proc. Biol. Soc. Wash. 51:34. 1938), type from Guatemala, Dept. Chimaltenango. Maxon compared *P. skutchii* to *P. strictissimum* Hieron. [≡*Grammitis jamesonii* (Hook.) Morton], from Venezuela to Ecuador, but I believe that the relationship is exceedingly close to *G. myosuroides*, the main difference being that the fertile portion of the frond in *G. skutchii* is entire.

19. **Grammitis pilosissima** (Mart. & Gal.) Morton, Contr. U.S. Natl. Herb. 38:114. 1967.

—*Polypodium pilosissimum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):39. pl. 9, fig. 2. 1842. —*Ctenopteris pilosissima* (Mart. & Gal.) Copel., Philipp. J. Sci. 84:390. 1955. —SYNTYPES: Mexico, Oaxaca and Veracruz, *Galeotti 6310* (BR!), *6379* (BR—5 sheets!). I choose *Galeotti 6379*, Herb. Martens, as lectotype. Isolectotype and lectoparatype at K!.

ILLUSTRATIONS: original; also, Matuda, Anales Inst. Biol. Univ. Nac. México 27:152. 1956; Vareschi, Fl. Venez. 1(2):pl. 190. 1969.

Similar to *G. xiphopteroides* but differing in (1) the stipe and rachis with more numerous, longer hairs, mostly 1.5–3.0 mm long; (2) longer stipe; (3) blade truncate below, with 1 to few reduced triangular segments; (4) pinnae directed upwards (ca. 60–80° from rachis), usually acutish at tip; (5) leaf tissue below with numerous patent hairs, even on sterile pinnae.

Epiphytic (ours) in Evergreen Cloud Forest, rarely Montane Rain Forest; higher peaks of Central Plateau, s Sierra Madre; 2700–3600 m. Southern Mex. (Gro., Oax., Ver., Méx.), Guat., C.R. CHIAPAS COLLECTIONS: *GM 101* (DS); *EM 2379a* (MEXU, US); *G 317* (PH, YU); *15366*; *22020*; *22072*; *22928*; *24310*; *24380*; *29353*; *31821*; *32030*; *40362*; *40451*.

In Chiapas, *G. pilosissima* nearly always grows at higher elevation than does *G. xiphopteroides*; the two are easily distinguishable by the characters given above. Collections from the top of Volcán Tacaná (*24310, 29353, EM 2379a*) differ from the other Chiapas collections in having longer-creeping, more spreading-scaly rhizome, nearly glabrous stipe, and laminar hairs confined to the vicinity of the sori; these collections may prove to represent a distinct variety or even species closely related to *G. pilosissima*.

Morton (1967) described *G. pilosissima* as being saxicolous or terrestrial; however, all Chiapas collections were epiphytic.

20. **Grammitis semihirsuta** (Klotzsch) Morton, Contr. U.S. Natl. Herb. 38:113. 1967.

—*Polypodium semihirsutum* Klotzsch, Linnaea 20:379. 1847. —*Ctenopteris semihirsuta* (Klotzsch) Copel., Philipp. J. Sci. 84:450. 1955. —TYPE: Peru, *Ruiz & Pavon* [Herb. Ruiz n. 9] (isotypes US).

ILLUSTRATION: Fée, Crypt. Vasc. Brés. 1:pl. 76, fig. 2. 1869 [as *Polypodium gratum* Fée].

Rhizome short-creeping, densely clothed with lanceolate, dark-castaneous, ciliate scales ca. 5 mm long, 0.5 mm broad; fronds mostly 25–55 cm long, to ca. 6 cm broad, with stipe brownish, dull, to ca. 15 cm long, 1 mm broad, patent-hairy, hairs castaneous, mostly 2–4 mm long; blades deeply pinnatisect to fully pinnate below, pinnae adnate, lowermost 2–5 pairs somewhat reduced; pinnae oblong-lanceolate, rounded to subacute at tip, to ca. 6 mm broad; rachis below with scattered castaneous hairs ca. 1 mm long, also bearing black, clavate, fungal fruiting bodies ca. 1 mm long, this fungus also evident on costae and veins below; veins to ca. 12 pairs per segment, blackish below; leaf tissue ± glabrous on both sides or with a few hairs along margin of segments, above with conspicuous white lime-dots at the ends of veins; sori round, supramedial to submarginal at ends of veins; sporangia glabrous; $2n$ = ca. 148 (Jam.).

Epiphyte in Montane Rain Forest, Evergreen Cloud Forest; uncommon in s Sierra Madre, Central Plateau; 2300–2700 (4100) m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol.); Jam., Hisp. CHIAPAS COLLECTIONS: *EM 2879* (K, MEXU, US); *24377*; *31873*; *33554*; *41111*.

See comments under *G. anfractuosa* for discussion of the peculiar fungus apparently always occurring on this species.

21. **Grammitis subtilis** (Kunze ex Klotzsch) Morton, Contr. U.S. Natl. Herb. 38:104. 1967.

—*Polypodium subtile* Kunze ex Klotzsch, Linnaea 20:375. 1847. —*Ctenopteris subtilis* (Kunze ex Klotzsch) J. Smith, Hist. Fil. 184. 1875. —TYPE: Venezuela, Mérida, *Moritz 325* (isotypes K! US).

ILLUSTRATION: Hooker, Sp. Fil. 4:pl. 275. 1862 (drawn from isotype).

Rhizome short-creeping to suberect, bearing at apex small, glabrous (ours), lanceolate, blackish scales less than 1 mm long; fronds numerous, arching, caespitose, ca. 7 cm long, 0.8 cm broad, with filamentous, hairy stipes less than 1 cm long, 0.2 mm diam.; blades linear, deeply pinnatisect, lowermost 1–2 pairs of pinnae slightly reduced; pinnae oblong, rounded at tip; leaf tissue thin, membranous, on both sides bearing tan hairs mostly 1.5–3 mm long; leaf tissue above with prominent whitish lime-dots at vein endings; sori round, 1–2 pairs per segment, with hairs intermixed; sporangia glabrous.

Epiphyte in Montane Rain Forest; rare, known from two widely scattered localities in the Central Plateau; 1300–2100 m. Southern Mex. (Chis. only), Guat., C.R., Pan.; S.A. (Col., Ecu.). Chiapas Collections: *GM 51* (DS); *32207*.

22. **Grammitis trichomanoides** (Swartz) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10:16. 1940.

—*Polypodium trichomanoides* Swartz, Prodr. Veg. Ind. Occ. 131. 1788. —*Xiphopteris trichomanoides* (Swartz) Copel., Gen. Fil. 215. 1947. —Type: Jamaica, *Swartz s.n.*

Illustration: Maxon (1916:pl. 35).

Rhizome erect, bearing at apex conspicuous, thick, tan to golden, lanceolate, glabrous scales to ca. 4 mm long, 0.5 mm wide; fronds fasciculate, arching, mostly 6–10 cm long, 0.5–0.6 cm broad, without distinct stipe; blade linear, gradually reduced to the rhizome; pinnae to ca. 40 pairs, separated by about half their width, fertile ones conspicuously gibbous at the superior base, rounded to subacute at apex; costae hidden, with a single anterior veinlet; leaf tissue on both sides and pinna margins with stiff reddish bristles ca. 2 mm long; sori one per pinna, located at base of acroscopic veinlet; sporangia glabrous; n = ca. 36 (Braz.).

Epiphytic, Montane Rain Forest, Pine-Oak-Liquidambar Forest; rare, known from three collections in the se Central Plateau (vicinity of Lago Tziscao); 1300 m. Southern Mex. (Chis. only), Guat., Hond., Nic.; S.A. (Ven., Fr. Gui.); Cuba, Jam. Chiapas Collections: *29554*, pt.; *32225*, pt.; *38886*.

23. **Grammitis xiphopteroides** (Liebm.) A. R. Smith, Amer. Fern J. 70:26. 1980.

—*Polypodium xiphopteroides* Liebm., Kongel. Danske. Vidensk. Skr., Naturvidensk. Afd. (5)1:196. 1849. —Syntypes: Mexico. Veracruz, "pr. Totutla" *Liebmann* [Liebm. Pl. Mex. 2549, Fl. Mex. 190 and 188] (C! isosyntype K!); Veracruz, "Hac. de Mirador," *Liebmann* [Liebm. Pl. Mex. 2548, Fl. Mex. 189] (C!); Oaxaca, "Yavesia," *Liebmann* [Liebm. Pl. Mex. 2550, Fl. Mex. 188] (C!); Oaxaca, "Trapiche de la Concepcion," *Liebmann* [Liebm. Pl. Mex. 2547, Fl. Mex. 189] (C!). I choose Liebm. Pl. Mex. 2548 as lectotype.

Polypodium rigens Maxon, Proc. U.S. Natl. Mus. 27:741. 1904. —*Ctenopteris rigens* (Maxon) Copel., Philipp. J. Sci. 84:422. 1956. —*Grammitis rigens* (Maxon) Proctor, Brit. Fern Gaz. 9:219. 1965. —Type: Jamaica, John Crow Peak, *Maxon 1346* (US).

Illustration: none found.

Plants often aromatic when dried; rhizome elongate, to ca. 4 mm thick, usually creeping, densely clothed with clathrate, iridescent (under a lens), lanceolate scales to ca. 4 mm long, 0.6 mm broad; fronds extremely variable in size, 6–28 cm long, with stipe mostly 1–4 cm long, to 1 mm diam., patent-hairy, hairs reddish black, 1–2 mm long; blade pinnatisect, broadest in middle, tapering below through numerous, gradually reduced segments, distally with a caudate apex; pinnae oblong, patent, rounded at tip, dilate and adnate at base, 2–16 mm long, 1–4 mm broad; rachis below bearing scattered hairs like those of stipe, without clavate fungal fruiting bodies; leaf tissue glabrous on both sides except for a single apical seta and occasionally a few scattered bristles along costae below, also with reddish bristles concentrated around and in sori (sterile segments thus ± glabrous below); sori 1–10 pairs per segment; sporangia glabrous.

Epiphyte in Montane Rain Forest, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, rarely Evergreen Cloud Forest, Lower Montane Rain Forest; common in the Northern Highlands and se Central Plateau, uncommon in the Sierra Madre, Eastern Highlands, and elsewhere in the Central Plateau; 800–2300 (2800) m. Southern Mex. (Oax.), Guat., C.R., Pan.; S.A. (Col. to Peru); Gr. Antill. Chiapas Collections: *GM 70B* (DS, US); *GM 101a*, pt. (DS, US); *H&S 20426*, pt. (US); *21214*, pt.; *21789*; *22070*, pt.; *22073*; *22107*; *22381*; *24868*; *28197*; *29555*; *29626*; *29900*, pt.; *29901*; *29970*, pt.; *30435*; *30891*; *31429*; *31430*; *31978*; *32120*; *32193*; *32448*; *32524*; *33555*; *36936*; *36967*; *38755*; *38885b*; *38976b*; *41356*; *42067b*.

This is the commonest and most variable species of *Grammitis* in Chiapas, especially at middle elevations. It has been confused often with *G. pilosissima* (which see for differences), but in Chiapas it is relatively easy to distinguish most specimens of the two species. Morton (Contr. U.S. Natl. Herb. 38:114. 1967) was uncertain of the differences between *G. xiphopteroides* (*G. rigens*) and *G. pilosissima*.

Some plants of *G. xiphopteroides* become fertile at very small sizes (e.g., *29901, 31429, 32193*) and can be mistaken for *G. anfractuosa* or even *G. moniliformis*. Other specimens attain very large size (e.g., *GM 70B, 33555*). I can find no other characters to separate these extremes.

A complex situation exists on Zontehuitz, where *G. xiphopteroides*, *G. moniliformis*, and *G. pilosissima* all exist in their typical form; there are also some specimens of *G. xiphopteroides* that seem to vary in the direction of *G. moniliformis* (e.g., *22070*, pt.). Some other collections of *G. xiphopteroides* seem to vary in the direction of *G. pilosissima* (e.g., *22073, 22107*). Zontehuitz is the only area known in Chiapas where all three species occur together; further work is needed to explain the variation found there.

Species to Be Looked for in Chiapas

Grammitis (*Xiphopteris*) *cookii* (Underw. & Maxon ex Maxon) Seymour —Guat., C.R. Apparently related to *G. trichomanoides*, but the segments not gibbous, the veins of all segments simple; from *G. delitescens*, differing in the setose blade and oblong segments.

Grammitis (*Cryptosorus*) *dissimulans* (Maxon) Seymour —known only from Guat.; perhaps related to *G. leptostoma*.

Grammitis (*Cryptosorus*) *kalbreyeri* (Baker) Morton —Guat., C.R., Pan., S.A. (Ven. and Col. to Peru, s Braz.). Of Chiapas species, related only to *G. margaritata*, but fronds of *G. kalbreyeri* are broadly deltoid and rhizome scales not ciliate; sori with whitish glands intermixed.

Grammitis (*Cryptosorus*) *lehmanniana* (Hieron.) Morton —Guat., C.R., Ecu.; closely related to (and possibly conspecific with) *G. asplenifolia*, which see.

Grammitis (*Xiphopteris*) *limula* (Christ) L. D. Gómez —Guat., C. R., Pan., Ven.; closely related to (and possibly conspecific with) *G. delitescens*, which see for differences.

Polypodium (*Cryptosorus*) *megaloura* Copel. —Guat. (Alta Verapaz). From the description, apparently closely related to (and questionably distinct from) *G. xiphopteroides*. It would seem not to be the same as *G. pilosissima*, to which Lellinger referred it (Phytologia 31:179. 1975); in southern Mexico and Guatemala, *G. pilosissima* grows only at very high elevations and has setose leaf tissue.

Grammitis (*Grammitastrum*) *minuscula* (Maxon) Copel. —Guat. (Alta Verapaz); differs from all Chiapas species by its entire, elliptic fronds and ± round sori.

Grammitis (*Xiphopteris*) *mitchellae* (Baker) Seymour —Bel., Guat., Nic., C.R.?, Pan. Distinguished from other Chiapas species of sect. *Xiphopteris* by its setose sporangia; for photo, see Contr. U.S. Natl. Herb. 17:pl. 14. 1914.

Grammitis (*Cryptosorus*) *senilis* (Fée) Morton —Guat., C.R., Pan., S.A. (Ecu.). Related to *G. mollissima* (but with rhizome scales) and *G. cultrata* (but with segments only two times longer than broad).

Grammitis (*Xiphopteris*) *skutchii* (Maxon) Seymour —Guat.; closely related to *G. myosuroides*, which see for discussion.

Grammitis (*Cryptosorus*) *trifurcata* (L.) Copel. —Guat., C.R., S.A. (Ven. to Sur. and Bol.), Antill. Closely related to *G. harrissii*, but blade lobed about one-third the way to midrib; sori in several series, mostly round, a few elongate.

Several undescribed *Grammitis* occur in Oaxaca and are likely to be found in Chiapas (Mickel, pers. comm.).

43. GYMNOPTERIS

Gymnopteris Bernh., J. Bot. (Schrader) 1799(1):297. 1799. —TYPE: *Acrostichum rufum* L. [≡*Gymnopteris rufa* (L.) Underw.].

Gymnogramma Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:304. 1811 (nom. superfl.). —TYPE: *Gymnogramma rufa* (L.) Desv. [≡*Gymnopteris rufa* (L.) Underw.]. Desvaux enumerated 13 species as belonging to *Gymnogramma*, but since he included *G. rufa*, the type of *Gymnopteris*, Desvaux's name is superfluous and the type of *Gymnogramma* is automatically *G. rufa*.

Plants terrestrial; rhizome short-creeping to erect, scaly, dictyostelic, bearing linear-lanceolate scales; stipes crowded, stramineous to often dark, scaly and hairy at the base, elsewhere hairy to glabrous; blade 1–2-pinnate; veins free, forking or anastomosing in 1 sp.; sporangia borne along veins, exindusiate; spores globose-tetrahedral, tuberculate to reticulate-crested; $x = 30$.

About seven species, four in tropical and subtropical America (NW Mex. to Bol., SE Braz.), the rest in Pakistan, India, and southern China. *Gymnopteris* is most closely related to *Hemionitis*, and Mickel (1974, 1979) believed that the distinctions between them were artificial and should be abandoned. *Hemionitis* has priority.

REFERENCES: LELLINGER, D. B. 1969. The taxonomic position of *Coniogramme americana*. Amer. Fern J. 59:61–65; MICKEL, J. T. 1974. A redefinition of the genus *Hemionitis*. Amer. Fern J. 64:3–12; GIANNASI, D. E., AND J. T. MICKEL. 1979. Systematic implications of flavonoid pigments in the fern genus *Hemionitis* (Adiantaceae). Brittonia 31:405–412.

Venation areolate; pinnae mostly 2–5 (7) lateral pairs; stipe stramineous to tan, glabrous .... 2. *G. subcordata*
Venation free; pinnae generally more than 5 lateral pairs; stipe purplish brown, hairy .... 1. *G. rufa*

1. **Gymnopteris rufa** (L.) Bernh. ex Underw., Bull. Torrey Bot. Club 29:627. 1902.

—*Acrostichum rufum* L., Syst. Nat., ed. 10, 2:1320. 1759. —*Hemionitis rufa* (L.) Swartz, J. Bot. (Schrader) 1800(2):16. "1801" [1802]. —*Gymnogramma rufa* (L.) Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:304. 1811. —TYPE (according to Tryon, Contr. Gray Herb. 194:82. 1964): Sloane, Nat. Hist. Jam. 1:pl. 45, fig. 1, 1707, illustrating a plant from Jamaica; LINN 1245.6 is also this species.

ILLUSTRATIONS: Tryon, Contr. Gray Herb. 194:83. 1964; Lowe, Ferns 1:pl. 6A. 1856; J. Smith, Ferns Brit. & For. 125. 1866.

Rhizome suberect; fronds ca. 20–60 cm long, with stipe (⅓) ½–⅔ blade length; stipe and rachis dark reddish brown to atropurpureous, pubescent with short, acicular trichomes and fewer, long, multicellular ones; blade 1-pinnate, with a conform terminal pinna; pinnae elliptic, mostly 7–12 lateral pairs, 5–8 cm long, broadly cuneate to subcordate at base, short-stalked to 5 mm, acute at apex, entire; veins free; leaf tissue on both sides more or less pubescent with acicular, multicellular, ± appressed trichomes; $n = 30$ (Jam.).

In Tropical Rain Forest; rare in Eastern Highlands, s Sierra Madre; 300–1000 m. Southern Mex. (Oax.), Guat., Nic., Pan.; S.A. (Col., Peru); Gr. Antill. CHIAPAS COLLECTIONS: *EM 2523* (MEXU, US); *33138*; *42848*.

Mickel (1974) reported hybrids between this species and *Hemionitis*. No hybrids involving this species have been found in Chiapas.

2. **Gymnopteris subcordata** (D. C. Eaton ex Davenp.) Underw., Bull. Torrey Bot. Club 29:628. 1902.

—*Gymogramma subcordata* D. C. Eaton ex Davenp. *in* Rose, Contr. U.S. Natl. Herb. 5:138, pl. 16. 1897. —*Coniogramme subcordata* (D. C. Eaton ex Davenp.) Maxon, Contr. U.S. Natl. Herb. 17:174. 1913 (not Copel., 1910). —*Coniogramme americana* Maxon, Contr. U.S. Natl. Herb. 17:607. 1916. —*Hemionitis subcordata* (D. C. Eaton ex Dav.) Mickel, Brittonia 31:411. 1979. —SYNTYPES: Mexico, Ymala and Lodiego, *E. Palmer 1416* and *1572* (US; isosyntype of *1416* at UC!).

ILLUSTRATIONS: **Fig. 43**; also Lellinger (1969:figs. 6, 9; venation and spores); Mickel (1974:figs. 3, 22, 45).

Rhizome short-creeping; fronds mostly 25–50 cm long, with stipe equaling or slightly longer than blade; stipe and rachis stramineous, glabrous or glabrescent; blade 1 (2)-pinnate; pinnae ovate, 2–7 lateral pairs, mostly 5–10 cm long, 1.5–3.5 cm broad, rounded to subcordate at base, sessile to stalked up to 5 mm, acute at apex, entire to crenulate along margin; veins anastomosing; leaf tissue on both sides glabrous.

Slope with *Quercus*, *Cnidoscolus*, *Guazuma*, *Diospyros*, *Luehea*, and *Plumeria*; rare at interface between Central Depression and Sierra Madre; 1000 m. Western and s Mex. (Sin., Cma., Nay., Méx., Mich., Oax.), Guat. CHIAPAS COLLECTION: *26995*.

44. HECISTOPTERIS

See comments at the end of *Vittaria*.

45. HEMIDICTYUM

Hemidictyum Presl, Tent. Pterid. 110, pl. 3, fig. 24. 1836. —Type: *Hemidictyum marginatum* (L.) Presl [≡*Asplenium marginatum* L.].

Terrestrial; rhizome stout, erect, scaly, scales brownish, subclathrate; stipe stout, with 2 vascular strands; blade glabrous, pinnate, pinnae opposite to subopposite, sessile; veins parallel, close, mostly 1-forked near base, branches joined about halfway to margin, giving rise to numerous trapeziform or elongate hexagonal areoles, without included veinlets, outermost series transversely joined by a continuous intramarginal vein; sori narrowly linear, confined to main vein-branches (between costa and first anastomosis), simple; indusia lateral, linear, very narrow, membranous; spores bilateral, with a perispore; $x = 31$.

Monotypic, the sole species widespread in the Neotropics. Its affinities are uncertain. Copeland thought it near *Athyrium* (*Diplazium*), but the chromosome number casts doubt on this relationship.

1. **Hemidictyum marginatum** (L.) Presl, Tent. Pterid. 111, pl. 3, fig. 24. 1836.

—*Asplenium marginatum* L., Sp. Pl. 2:1082. 1753. —*Diplazium marginatum* (L.) Diels *in* Engl. & Prantl, Pflanzenfam. 1(4):229. 1899. —Type: typification uncertain; LINN 1250.20 is this species; Linnaeus cited Petiver's Pter. Amer. pl. 12, fig. 2, which is a redrawing of Plumier's Tract. Fil. Amer. pl. 106 (1705), illustrating a plant from either Martinique or Hispaniola.

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 29. 1909; Hooker, Fil. Exot. pl. 73. 1858.

Caudex to ca. 30 cm high, 15 cm in diam.; fronds to 3 m long, erect-arching, stipe half as long as blade, stout (to 2 cm diam.), stramineous or darkened at the scaly base; blade oblong, 1–2 m long, 0.5–1 m broad, imparipinnate; pinnae 6–15 cm apart, linear-oblong to ligulate, 25–55 cm long, 6–12 cm broad, abruptly acuminate-cuspidate, all but uppermost ones cordate-clasping, these obliquely truncate distally, terminal pinna conform, enlarged or not, cordate to broadly cuneate at base; sori to 4 cm long, ca. 1.5–2.0 mm apart, parallel; leaf tissue bright green, succulent, papyraceous and fragile in drying; $n = 31$ (Trin.).

Forests and stream banks; uncommon in Northern Highlands; low and middle elevations. Southern Mex. (Ver., Oax.), Nic., C.R.; S.A. (Col. and Ven. to Bol., s Braz.); Antill., Trin.

Chiapas Collections: *P 6764* (UC-2, US); *GM s.n.* (DS, US); *R 857* (PH); *G 378* (K); *C&D 233* (US).

46. HEMIONITIS

Hemionitis L., Sp. Pl. 2:1077. 1753. —Type: *Hemionitis palmata* L.

Terrestrial; rhizome small, short, erect or suberect, dictyostelic, bearing thin, tan scales; fronds crowded, small, monomorphic or subdimorphic, pedately lobed; stipe hairy, dark castaneous, shining; veins anastomosing and forming numerous small areoles; leaf tissue herbaceous, bearing numerous acicular or multiseptate hairs on both sides of blade; sporangia borne along veins nearly to margin; indusia and paraphyses absent; spores globose-tetrahedral, tuberculate to cristate; $x = 30$.

As commonly construed, about five species, with the center of distribution in southern Mexico; one somewhat aberrant Old World species, *H. arifolia*. *Hemionitis* is closely related to *Gymnopteris*, with which there is some hybridization. Mickel (1974), using comparative morphology, spore ornamentation, and chemical evidence, proposed uniting *Gymnopteris* with *Hemionitis*. According to Mickel, *H. arifolia* and *H. elegans* possess several characters in common with species traditionally placed in *Gymnopteris* and differ by these same characters from the other species in *Hemionitis*.

Reference: Mickel, J. T. 1974. A redefinition of *Hemionitis*. Amer. Fern J. 64:3–12. See under *Gymnopteris* for an additional reference.

Frond margin deeply crenate; fertile blade with a single pair of lateral lobes .... 1. *H. palmata*
Frond margin entire to shallowly crenate; fertile blade with 2–3 pairs of lateral lobes .... 2. *H. pinnatifida*

1. **Hemionitis palmata** L., Sp. Pl. 2:1077. 1753.

—Type: uncertain; LINN 1248.3 is this species but was added to LINN after 1755 (Jackson, 1912); Linnaeus cited several illustrations, including Plumier's Descr. Pl. Amer. pl. 33 (1693).

Illustrations: Tryon, Contr. Gray Herb. 194:85. 1964; Rovirosa, Pterid. Sur Mex. pl. 54. 1909; Diels, Nat. Pflanzenf. 1(4):261, fig. 138 c, d. 1899; Proctor, Fl. L. Antill. 2:173. 1977.

Sterile fronds ca. 3–10 cm long, 3-lobed or pedately 5-lobed, clustered at the base of the few, erect, pedately 5-lobed fertile fronds that are ca. 10–30 cm long; stipe of sterile fronds mostly 1–7 cm long, to 25 cm long in fertile fronds, hairy, dark purplish brown; principal lobes crenate to shallowly lobed on margin, tawny- to rufous-pubescent with multicellular trichomes, these especially evident along margin; laminar buds frequently present in axils of distal leaf lobes; $n = 30$ (Oax., Jam., C.R.).

Ravines and cafetals in Seasonal Evergreen Forest, Lower Montane and Montane rain forests; uncommon in Northern Highlands (not Jitotol Ridge), s Sierra Madre; 200–800 m. Tropical Mex. (Cma., Gro., Tam., Ver., S.L.P., Oax., Tab., Yuc.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Gui., Peru, Bol., Braz.); Antill., Trin. Chiapas Collections: *G 388* (K); *27129*; *27483*; *28527*; *32853*.

Mickel (1974) recorded a hybrid between this species and *H. pinnatifida* in Oaxaca. In Chiapas, the two species appear to grow in similar habitats, but I have not yet found them growing together nor found evidence of hybridization.

2. Hemionitis pinnatifida Baker, Syn. Fil. 399. 1868.

—Syntypes: Costa Rica, *Wendland 438* (presumably K, not found); Guatemala, *Bernoulli 32* (K, not found).

Illustrations: **Fig. 18**; Mickel (1974:4, fig. 7, labeled *H. levyi,* in error).

Similar to *H. palmata,* but sterile fronds with 2–4 pairs of lateral lobes; fertile fronds more deeply lobed, with usually 2 (3) pairs of lateral lobes; principal lobes entire, subentire, or shallowly notched; $n = 60$ (Oax.).

Wooded slopes and ravines, roadsides, in Seasonal Evergreen Forest, Montane Rain Forest; uncommon in s Pacific Coastal Plain, and w and n edges of Central Depression, where they adjoin Sierra Madre and Northern Highlands; 750–1300 m. Southern Mex. (Oax.), Guat., C.R. Chiapas Collections: *EM 2128* (MEXU, UC); *21907*; *38432*; *40166*.

Species to Be Looked for in Chiapas

Hemionitis elegans Davenp. —Mlos., Jal., Oax.; distinguished from other species of *Hemionitis* by its very short-hairy to glabrous blade and entire lobes. According to Mickel (1974), it has the chemistry and spore morphology of species of *Gymnopteris.*

Hemionitis levyi Fourn. —Oax., Salv., Nic., C.R.; related to *H. palmata,* but with less deeply lobed blade.

47. HISTIOPTERIS

Histiopteris (J. G. Agardh) J. Smith, Hist. Fil. 294. 1875. —*Pteris* L. sect. *Histiopteris* J. G. Agardh, Rec. Spec. Gen. Pteridis 76. 1839. —Lectotype (first chosen by ?): *Pteris vespertilionis* Lab. [≡*Histiopteris vespertilionis* (Lab.) J. Smith] = *Histiopteris incisa* (Thunb.) J. Smith.

Plants terrestrial; rhizome long-creeping, solenostelic, with castaneous hairs and hairlike scales; fronds usually large, distant, erect to subscandent, apex continuing in growth for a long time; stipe atropurpureous to stramineous, shining, glabrous (except at base), with a single corrugated vascular strand; rachis dark to stramineous, shining, slightly grooved adaxially, costae and costules more deeply grooved; pinnae opposite, sessile, pinnate or bipinnate, often with reduced, stipulelike basal pinnules, the pinnules also opposite; leaf tissue firm, herbaceous to subcoriaceous, glabrous or with scattered, uniseriate, multicellular, crisped hairs, often glaucous; veins anastomosing without included veinlets, with regular rows of costal and costular areoles; sori marginal, continuous, covered by reflexed edge of blade, without an inner indusium; spores bilateral, monolete, yellow to tan, translucent, with a slightly raised reticulum; $x = 48$?

One widespread, pantropical and austral, extremely polymorphic species and about four localized species in Southeast Asia and the Pacific Basin. *Histiopteris* has the aspect of *Pteridium,* to which it is closely related, but it apparently does not form thickets, as *Pteridium* often does.

1. Histiopteris incisa (Thunb.) J. Smith, Hist. Fil. 295. 1875.

—*Pteris incisa* Thunb., Prodr. Pl. Cap. 171. 1800. —*Litobrochia incisa* (Thunb.) Presl, Tent. Pterid. 149. 1836. —Type: Cap. Bon. Spei [South Africa, Cape of Good Hope], 1774, *Thunberg* (presumably UPS; isotype S).

Illustrations: Holttum, Fl. Malaya, II, Ferns. 392. 1954; Tryon, Contr. Gray Herb. 194:187. 1964; Proctor, Fl. L. Antill. 2:139. 1977.

Rhizome mostly 5–10 mm diam., with linear-lanceolate, castaneous, turgid scales up to ca. 4 cells broad and castaneous hairs; fronds mostly 1–4 m long; stipe 15–100 (200) cm long to ca. 1 cm diam.; blade mostly 0.5–3 m or more long, 0.3–2 m broad, 2–4-pinnate, usually bipinnate-pinnatifid; ultimate segments oblong to lanceolate to deltoid, subacute to rounded at tip, basal pinnules often stipular, reduced, becoming increasingly adnate to rachis on more distal pinnae; veins partially areolate, basal ones arcuately joined, others free to margin, or all but outermost united in one or more rows of oblique, polygonal areoles; blades glabrous above and below (Mexican specimens), often glaucous; spores yellowish; $n = 48$ (Jap.), 96 (Jam.), ca. 100 (Tristan da Cunha).

Open slopes and thickets, adjacent to Evergreen Cloud Forest; uncommon on higher peaks of Central Plateau; 2700–2800 m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic., C.R.; S.A. (Col. to Bol., s Braz.); Antill.; S. Afr., SE Asia to N.Z., Tasmania, J. Fernán. Is. Chiapas Collections: *GM 96* (DS); *22015*; *22048*; *32045*; *40928*.

48. HYMENOPHYLLUM

Hymenophyllum J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:418. 1793. —Lectotype (chosen by Presl, Hymenophyll. 31. "1843" [1844]): *Hymenophyllum tunbridgense* (L.) J. E. Smith.

Sphaerocionium Presl, Hymenophyll. 33. "1843" [1844]. —Lectotype (chosen by Copeland, Philipp. J. Sci. 64:10. 1937): *Sphaerocionium hirsutum* (L.) Presl [≡*Hymenophyllum hirsutum* (L.) Swartz].

Hymenophyllum subg. *Mecodium* Copel., Philipp. J. Sci. 64:93. 1937. —Type (chosen by Copeland, op. cit., p. 10): *Hymenophyllum polyanthos* (Swartz) Swartz.

Mecodium Presl ex Copel., Philipp. J. Sci. 67:17. 1938. —Type: *Mecodium sanguinolentum* (G. Forst.) Presl ex Copel. (following Pichi-Sermolli, Webbia 32:76, 1977; for a different opinion, see Morton, Contr. U.S. Natl. Herb. 38:172, 1968).

For additional synonymy, see Morton, 1968.

Plants commonly epiphytic, occasionally on rocks; rhizome long-creeping, commonly filamentous, less than 0.5 mm diam.; fronds commonly small with filamentous stipe; blade commonly pinnatifid to several times pinnate or pinnatifid, determinate or indeterminate; leaf tissue thin, one cell thick, without stomata; hairs present or lacking on veins, margin, and leaf tissue; sori marginal, consisting of bivalved involucres containing a short to infrequently long and exserted receptacle that bears the sporangia; sporangia maturing simultaneously or basipetally; spores tetrahedral, greenish; gametophytes filamentous; x = 11, 13, 18, 21, 22, 28, 36.

Pantropical, with a few species extending into wet temperate areas. Following Morton (1968), I recognize *Hymenophyllum* in a broad sense; so defined, the genus contains perhaps 300 species. Copeland (1947) split *Hymenophyllum* into numerous small genera, and if his generic circumscriptions were to be followed, four hymenophylloid genera occur in Chiapas. Twenty-two species are known from the state, with the number in the Neotropics exceeding 100.

I follow Morton (1968) in the circumscription of subgenera and sections of *Hymenophyllum*.

References: Morton, C. V. 1947. The American species of *Hymenophyllum* section *Sphaerocionium*. Contr. U.S. Natl. Herb. 29:139–199; 1968. The genera, subgenera, and sections of the Hymenophyllaceae. Contr. U.S. Natl. Herb. 38:153–214.

a. Margin of segments toothed, the teeth not tipped by hairs (subg. *Hymenophyllum*).

b. Sori directed in a plane ± perpendicular to plane of lamina, arched at base and somewhat penduculate; segments 0.7–1.0 mm broad; stipe glabrescent (sect. *Hymenophyllum*) .... 21. *H. tunbridgense*

bb. Sori directed in plane of lamina, not arched at base or pedunculate; segments mostly 1.0–1.5 mm broad; stipe persistently hairy (sect. *Ptychophyllum*).

c. Involucres entire or serrulate near apex; sori 1–2 along acroscopic bases of pinnae; receptacle often much-exserted at maturity; stipe mostly greater than 2 cm long .... 10. *H. fucoides*

cc. Involucres laciniate to subciliate in apical half; sori 1–5 along acroscopic sides of pinnae; receptacle slightly or not at all exserted; stipe usually less than 2 cm long .... 7. *H. ectocarpon*

aa. Margin of segments entire, or if slightly denticulate, the teeth tipped by one-celled or stellate hairs.

d. Blade variously hairy, at least on margin or veins beneath (subg. *Sphaerocionium* sect. *Sphaerocionium*).

e. Hairs present on leaf surfaces, as well as on veins and margin (subsect. *Lanata*).

f. Stipe stout, 0.4–0.6 mm or more in diam.

g. Blade linear, 2.5–5 (8) cm broad; fronds pendent; pinnae reduced at base of lamina .... 18. *H. sieberi*

gg. Blade ovate, 5–10 cm broad; fronds arching; lowest pair of pinnae the largest or nearly so .... 5. *H. crassipetiolatum*

ff. Stipe filiform, 0.15–0.25 mm diam.

h. Pinnae mostly simple and linear; hairs of leaf margin obviously stalked; blade mostly 2–6 cm long .... 12. *H. lanatum*

hh. Pinnae with three or more pairs of segments; hairs of leaf margin usually sessile; blade 3–30 cm long.

i. Fronds pendent; blade 10–30 cm long, indeterminate; stipe hairs simple or few-forked with 1–2-rayed cells .... 8. *H. elegantulum*

ii. Fronds arching; blade 3–15 cm long, determinate; stipe hairs mostly stellate .... 9. *H. fragile*

ee. Hairs lacking on leaf surfaces, borne only on veins and margin (subsect. *Ciliata*).

j. Stipe delicate, not over 0.3 mm diam., usually less, short, not over 5 cm long, usually less.

k. Rachis not alate to base; pinnae (at least the lower) petiolulate .... 17. *H. pulchellum*

kk. Rachis alate to base; pinnae sessile or adnate.

l. Marginal hairs of segments mostly stellate, bistellate, or twice-forked; segments not undulate-crispate .... 11. *H. hirsutum*

ll. Marginal hairs of segments mostly simple or forked at base; segments undulate-crispate .... 6. *H. crispum*

jj. Stipe stouter, 0.3 mm diam. or more, larger ones almost always 5 cm long or more.

m. Rachis alate to base .... 13. *H. microcarpum*

mm. Rachis not alate to base .... 20. *H. trapezoidale*

dd. Blade glabrous.

n. Fronds small, with blade less than 5 cm long, often less than 2 cm long; receptacles of older involucres short- to long-exserted, bearing numerous sporangia; segments plane, not at all undulate; low elevations (<1300 m).

o. Blade mostly 2–4 cm long; involucres in a dense cluster at tip of frond; stipe narrowly or not at all alate .... 19. *H. siliquosum*

oo. Blade mostly less than 2 cm long; involucres one to several at tip, not tightly clustered, smaller; stipe alate or not.

p. Stipe alate nearly to base; sori several; ultimate segments less than 1.0 mm broad .... 3. *H. brevistipes*

pp. Stipe not alate; sori one per frond, apical; ultimate segments 1.5–2.0 mm wide ..... 1. *H. abruptum*

nn. Fronds larger, usually with blade greater than 5 cm long; receptacles not exserted, bearing few to numerous sporangia; segments plane or undulate-crisped; low (*H. polyanthos*) to generally middle or high elevations (>1300 m).

q. Segment margin strongly crisped to slightly undulate; involucres rounded at base and apex, not longer than broad, containing few (1–5) sporangia; blade ± indeterminate; stipe and lower part of rachis not alate.

r. Segments strongly crisped; pinnae imbricate .... 4. *H. fendlerianum*

rr. Segments slightly crisped; pinnae not imbricate .... 22. *H. undulatum*

qq. Segment margin plane to sometimes very slightly undulate in *H. myriocarpum* and *H. nigrescens*; involucres rounded to acute at base and apex, often longer than broad, containing numerous (5–15) sporangia; blade determinate or indeterminate (*H. myriocarpum*); stipe and lower part of rachis alate or not.

s. Blade indeterminate; older pinnae turning reddish brown; involucres orbicular; stipe and rachis alate; 2700–3000 m .... 14. *H. myriocarpum*

ss. Blade determinate; older pinnae not becoming reddish brown (entire fronds die uniformly); involucres orbicular to ovate, acutish at apex; stipe and rachis alate or not.

t. Blade linear, pinnatisect to pinnatifid with few lobes .... 2. *H. asplenioides*

tt. Blade ovate, 2–4 times pinnatisect.

u. Stipe and rachis broadly winged, wings ca. 0.5 mm wide; high elevation, (1700) 2300–2700 .... 15. *H. nigrescens*

uu. Stipe and rachis narrowly to not at all winged; low and middle elevations, 600–2300 (2700) m .... 16. *H. polyanthos*

1. **Hymenophyllum (Mecodium) abruptum** Hook., Sp. Fil. 1:88, pl. 31B. 1844.

—*Mecodium abruptum* (Hook.) Copel., Philipp. J. Sci. 67:26. 1938. —SYNTYPES: Jamaica, *Menzies s.n.*, *Purdie s.n.* (K! isosyntype of *Purdie s.n.* at BM!).

ILLUSTRATION: only the original.

Rhizome ca. 0.15 mm diam.; fronds very small, arching, determinate; stipe 3–20 mm long, 0.10–0.15 mm diam., not alate; blade broadly ovate, mostly 8–18 mm long, nearly as broad, pinnate with mostly 1–3 (6) pairs of lateral segments, these simple and undivided or the lower forking with 1–2 linear lobes; segments to nearly 10 mm long, mostly 1.5–2.0 mm wide, rounded at apex, plane; veins and leaf tissue glabrous; involucres purselike, immersed, in ours only a single terminal one per frond; receptacle often long-exserted, to 5 mm long, 3 mm exserted from involucre; n = 28 (Jam.).

Epiphytic, Montane Rain Forest; rare, in our area known from two collections in the vicinity of Lago Tziscao (SE corner of Central Plateau); 1300 m. Exact distribution uncertain but at least s Mex. (Oax.), Guat.; Jam. CHIAPAS COLLECTIONS: *29591*; *32205*.

Related to *H. brevistipes*, differing in the nonalate stipes, long-exserted receptacles, and in having somewhat less divided fronds with broader segments.

2. **Hymenophyllum (Mecodium) asplenioides** (Swartz) Swartz, J. Bot. (Schrader) 1800 (2):98. "1801" [1802].

—*Trichomanes asplenioides* Swartz, Prodr. Veg. Ind. Occ. 136. 1788. —*Mecodium asplenioides* (Swartz) Copel., Philipp. J. Sci. 67:26. 1938. —TYPE: Jamaica, presumably *Swartz s.n.* (S?).

ILLUSTRATIONS: Hooker, Icon. Pl. 10:pl. 956. 1854; Hedwig, Fil. Gen. et Sp. pl. 11, pt. 1799.

Rhizome filiform, (0.2) 0.3–0.4 mm diam.; fronds arching to pendent, determinate; stipe (1.5) 2–5 cm long, ca. 0.25 mm diam., not alate, glabrous; blade oblong, (3) 5–15 cm long, 1–3 (4) cm broad, slightly or not at all reduced at base, pinnatisect below to deeply and coarsely pinnatifid distally, rachis broadly winged throughout; pinnae decurrent, mostly oblong, coarsely pinnatifid, lobes few (1–4), ca. 2–3 mm broad, entire; veins and leaf tissue glabrous; involucres suborbicular to roundish-ovate, 2–2.5 mm broad, containing numerous sporangia; receptacle short, included; n = 36 (Jam.).

Epiphytic; known in Chiapas from a single collection, "Pedro River" [Northern Highlands]. Southern Mex. (Oax., Pue.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Guy., s Braz.); Gr. Antill. CHIAPAS COLLECTION: *GM 11*, pt. (US).

Not readily confused with other species of subg. *Mecodium* occurring in Chiapas.

3. **Hymenophyllum (Mecodium) brevistipes** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:290. 1849.

—SYNTYPES: four collections from Veracruz and Oaxaca, *Liebmann* (all C!). I choose as lectotype Liebm. Pl. Mex. 2127, Fl. Mexicana 557, "pr. S. Antonio Huatusco" (C!).

ILLUSTRATION: none found.

Rhizome ca. 0.25 mm diam.; fronds very small, arching, determinate; stipe mostly 2–10 mm long, 0.15–0.20 mm diam., narrowly alate, often to base; blade ± flabellate, mostly 6–15 mm long, nearly as broad, with 1–3 pairs of lateral segments, these bifid or trifid, flabellate, also a terminal segment that is 4–8-parted and flabellate; ultimate divisions 1–3 mm long, less than 1 mm broad, rounded at apex, plane; veins and leaf tissue glabrous; involucres purselike, immersed, ca. 1 mm broad, 1.5 mm long, ca. 4 at frond apex; receptacles included to short-exserted.

Epiphytic in Seasonal Evergreen Forest; rare, known in our area from a single collection, 3 km N of Ocozocoautla; 900 m. Exact distribution uncertain but at least s Mex. (Ver., Oax.), Bel., Guat., Hond., C.R., and Cuba. CHIAPAS COLLECTION: *21968*.

An earlier name may be *Hymenophyllum brevifrons* Kunze [Bot. Zeitung (Berlin) 1847:185; type from

French Guiana, *Leprieur s.n.* (isotype B—photo BM!)], often relegated to synonymy under *H. abruptum*; the description seems to apply just as well to this species. Another synonym may be *H. tablaziense* Christ (Bull. Soc. Bot. Genève (2)1:216. 1909), type from Costa Rica.

4. **Hymenophyllum (Mecodium) fendlerianum** Sturm *in* Martius, Fl. Bras. 1(2):291. 1859.

—*Mecodium fendlerianum* (Sturm) Copel., Philipp. J. Sci. 67:26. 1938. —Syntypes: both from Venezuela, Colonia Tovar, *Fendler 35* (isosyntypes BM!, BR—photo BM!); *Moritz 450* (isosyntype BM!).

Hymenophyllum contortum v. d. Bosch, Ned. Kruidk. Arch. 5(3):170. 1863. —*Mecodium contortum* (v. d. Bosch) Copel., Philipp. J. Sci. 67:26. 1938. —Type: Costa Rica, Aguacata, *Hoffmann s.n.* (B).

Illustration: none found.

Rhizome filiform, ca. 0.2 mm diam.; fronds arching, ± determinate; stipe mostly 2–5 cm long, less than 0.2 mm diam., not alate, glabrous, purplish black, wiry; blade oblong-lanceolate, mostly 4–10 (15) cm long, 1.5–4 cm broad, broadest at base or nearly so, 2–3-pinnate, rachis nonalate in lower part; pinnae contiguous or often imbricate, lowermost short-stalked, once or twice deeply pinnatifid, on older fronds the lower ones reddish brown; ultimate segments ca. 1 mm broad, conspicuously undulate-crispate, imbricate; rachis, veins, and leaf tissue glabrous; involucres few, inconspicuous, ca. 0.7–1.0 mm broad, 0.5–0.8 mm long, rounded at tip, containing few (1–3) sporangia; receptacle obsolete, hence not exserted.

Epiphytic in Montane Rain Forest, Pine-Oak-Liquidambar Forest; rare in Northern Highlands (Jitotol Ridge), SE corner of Central Plateau; 1300–1700 m. Southern Mex. (Oax., Ver.?), Guat., C.R.; S.A. (Col. and Ven. to Sur. and Bol., s Braz.); Gr. Antill. Chiapas Collections: *22382*; *32441*.

The name *Hymenophyllum crispum* H.B.K., a species of subg. *Sphaerocionium,* has often been misapplied to this species.

5. **Hymenophyllum (Sphaerocionium) crassipetiolatum** Stolze, Amer. Fern J. 66:15, fig. 1. 1976.

—Type: Guatemala, Dept. Zacapa, Volcán Gemelos, *Steyermark 43302* (US; isotypes F, GH).

Illustration: only the original.

Rhizome relatively stout, ca. 0.6 mm diam.; fronds arching or pendent, determinate to indeterminate, stipe 3–16 cm long, (0.5) 0.8–1.0 mm diam., nonalate, with numerous, stalked, stellate hairs; blade ovate-lanceolate, attenuate at apex, mostly 15–30 cm long, ca. 5–10 cm broad, lowest pinnae slightly reduced; rachis nonalate in lower third, increasingly alate in distal third because of decurrent pinnae; pinnae to ca. 25 pairs, ascending, to ca. 8 cm long, attenuate, twice pinnatifid; ultimate segments 0.6–1.0 mm broad, subacutish, plane; hairs of veins and leaf tissue scattered, mostly sessile, stellate (3–4-rayed), those of margin bistellate, located on a small tooth; involucres orbicular, immersed, with valves ca. 1 mm diam.

Epiphytic in Montane Rain Forest; uncommon in s Sierra Madre; 2000–2800 m. Southern Mex. (Chis. only), Guat., Salv., Hond. Chiapas Collections: *EM 2910* (MEXU, UC, US); *EM 5233* (DS, MEXU).

This is the largest species of *Hymenophyllum* in Mexico and is most closely related to *H. lindenii* Hook., known from Colombia, Venezuela, and Ecuador.

6. **Hymenophyllum (Sphaerocionium) crispum** H.B.K., Nov. Gen. et Sp. 1:26. 1815.

—*Sphaerocionium crispum* (H.B.K.) Klotzsch, Linnaea 18:537. 1844. —Type: Venezuela, "Silla de Caracas," *Humboldt s.n.* (Herb. Humb. & Bonpl.—P!).

For additional synonymy, see Morton (1947:160).

Illustration: Fée, Crypt. Vasc. Brés. 1:pl. 71, fig. 2. 1869 [*H. crispum* var. *brasiliana* Fée].

Rhizome filiform, 0.2 mm diam.; fronds prostrate or pendent, determinate; stipe 0.5–5 cm long, 0.2–0.3 mm diam., narrowly alate at apex, sparingly pilose, hairs simple or few-forked; blade ovate to linear, 5–18 cm long, 1.5–5 cm broad, lowest pinnae reduced, rachis alate throughout, wing conspicuously undulate; pinnae 10–25 pairs, spreading or ascending, 1–2.5 cm long, 5–12 mm broad, deeply pinnatifid, the costa alate; ultimate segments 2–5 pairs, simple or the lower rarely bifid, 1.0–1.5 (2) mm broad, conspicuously undulate-crispate; hairs of rachis, veins, and leaf margin few, forked or stellate on rachis, those of margin mostly simple, elongate; involucres scarcely immersed, the valves suborbicular, 1.2–1.5 mm long and broad.

Epiphytic or on rocks, in Montane Rain Forest, Evergreen Cloud Forest; rare in Central Plateau, s Sierra Madre; 2300–2700 m. Southern Mex. (Gro., Oax.), Guat., C.R.; S.A. (Col. to Bol., s Braz.); Jam. Chiapas Collections: *22668*; *29433*.

7. **Hymenophyllum (Ptychophyllum) ectocarpon** Fée, Mém. Fam. Foug. 11:115, pl. 31, fig. 1. 1866.

—Syntypes: Guadeloupe, "Matouba, Ravine Flore, Rivière Goyave," 1861, *L'Herminier s.n.*; Martinique, *Mlle. Rivoire s.n.* (presumably P).

Illustration: see original.

Similar to *H. fucoides,* differing in the laciniate to subciliate involucres; sori 1–5 along acroscopic side of pinnae, sometimes also 1–2 (3) along basiscopic side; receptacle slightly or not at all exserted; indusia somewhat or not at all constricted at the cuneate base, scarcely to partially immersed in leaf tissue; stipe mostly 1–2 cm long, 0.3–0.4 mm diam.

On logs in Montane Rain Forest; rare in Eastern Highlands (vicinity of Laguna Ocotal Grande); 800 m. Southern Mex. (Chis. only), Bel., Guat., Nic., C.R.; L. Antill. Chiapas Collection: *33010a*.

Hymenophyllum ectocarpon seems distinct from *H. fucoides,* but *Hymenophyllum* sect. *Ptychophyllum* in the New World is badly in need of monographic revision. In Guatemala, Stolze (Fieldiana, Bot. 39:61. 1976) reported that *H. ectocarpon* occurred at lower elevations than *H. fucoides,* and this also seems to be true in Chiapas. Proctor (Fl. L. Antill. 2:65. 1977) united *H. ectocarpon* with *H. fucoides.*

8. **Hymenophyllum (Sphaerocionium) elegantulum** v. d. Bosch, Ned. Kruidk. Arch. 4:408. "1859" [1858].

—*Sphaerocionium elegantulum* (v. d. Bosch) Copel., Philipp. J. Sci. 67:32. 1938. —Type: based on Hooker, Sp. Fil. 1:91, pl. 33A. 1844, which was in turn based on *Jameson s.n.*, Pillzhum, Ecuador (K! isotype NY).

Illustration: Vareschi, Fl. Venez. 1(1):pl. 47A, fig. 4. 1969.

Rhizome filiform, 0.15–0.2 mm diam.; fronds pendent, indeterminate; stipe 2–9 cm long, ca. 0.25 mm diam., nonalate throughout, with mostly simple, 2–3-celled hairs; blade commonly linear, 10–30 cm long, 2–4 cm broad, rachis nonalate at base or sometimes throughout, sparingly pilosulous; pinnae 10–30 pairs, subsessile or slightly adnate, 1–2 cm long, 8–13 mm broad, deeply pinnatifid with 4–6 pairs of lobes, or some pinnae elongate and frondlike, to 17 cm long, fully pinnate-pinnatifid; ultimate segments 1–1.5 mm broad; hairs of leaf surfaces, veins, and margin all stellate (or marginal hairs sometimes bistellate), stalked, 4–7-rayed; involucres not or only slightly immersed, valves broader than long, 1–1.5 mm broad.

Epiphytic or on wet banks or rocks in Evergreen Cloud Forest; uncommon in Central Plateau, Sierra Madre; 2500–3000 m. Southern Mex. (Gro., Oax., Ver.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Bol.); Cuba, Hisp. CHIAPAS COLLECTIONS: *EM 2908* (K, MEXU, US); *GM 106* (DS); *GM 180* (DS); *22054*; *22108*; *22711*; *22931*; *25402*; *30098*; *31794*.

9. Hymenophyllum (Sphaerocionium) fragile (Hedw.) Morton, Contr. U.S. Natl. Herb. 29:172. 1947.

—*Trichomanes fragile* Hedw., Fil. Gen. et Sp. pl. 18. 1802. —TYPE: "America meridionalis."

ILLUSTRATION: Vareschi, Fl. Venez. 1(1):pl. 43, fig. 5. 1969.

Rhizome 0.2 mm diam.; fronds pendent, ± determinate; stipe filiform, 0.5–2.5 cm long, 0.25 mm diam., alate only at apex (if at all), bearing forked or stellate hairs; blade ovate to linear-lanceolate, 3–15 cm long, 1.2–2.5 cm broad, rachis broadly alate throughout; pinnae ascending, 4–20 pairs, subflabellate, 5–15 mm long, 4–12 mm broad, pinnatifid, costa broadly winged, the lobes usually 1–2 on lower side and 2–3 on upper side; ultimate segments 1.5–2 mm broad; hairs of leaf surface (veins and leaf tissue) abundant, all stellate, sessile or very short-stalked (<0.1 mm), 3–6-rayed; sori confined to apical pinnae, involucral valves broader than long, ca. 1 mm broad, rounded.

Epiphytic or on wet rocks or banks, in Montane Rain Forest; uncommon in Northern Highlands (Jitotol Ridge), s Sierra Madre; 1700–2700 m. Southern Mex. (Hgo., Ver., Oax.), Guat., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Gr. Antill. CHIAPAS COLLECTIONS: *21457*; *29432*; *31622*; *32402*.

There are two additional collections that match *H. fragile* in frond form but bear long-stalked, forked, or stellate hairs on the veins and margin (*32681*, *33688*). The hair character is usually such a constant feature of *H. fragile* that I cannot place these specimens here; nor can I refer them to any other known species of subg. *Sphaerocionium*. They may represent an undescribed species.

10. Hymenophyllum (Ptychophyllum) fucoides (Swartz) Swartz, J. Bot. (Schrader) 1800(2):99. "1801" [1802].

—*Trichomanes fucoides* Swartz, Prodr. Veg. Ind. Occ. 136. 1788. —*Meringium fucoides* (Swartz) Copel., Philipp. J. Sci. 67:45. 1938. —TYPE: Jamaica, *Swartz s.n.* (S; photo UC!).

ILLUSTRATIONS: Hooker, Icon. Pl. 10:pl. 963. 1854; Christensen, Ark. Bot. 9(11):fig. 11, also pl. 4, fig. 3. 1910; Hedwig, Fil. Gen. et Sp. pl. 8. 1799.

Rhizome mostly 0.4–0.8 mm diam.; fronds arching or pendent, determinate; stipe mostly 2–6 cm long, 0.3–0.7 mm diam., narrowly alate toward apex, bearing stout, tan, septate hairs ca. 1 mm long; blade ovate-lanceolate, mostly (5) 8–18 cm long, 2–6 cm broad, rachis narrowly alate, lowermost pinnae often somewhat reduced; pinnae mostly 9–15 pairs, once to twice pinnatifid; ultimate segments simple or bifid, ca. 1.0–1.5 mm broad, denticulate at margin, often finely lacerate at apex; rachis with a few hairs like those of stipe, veins and leaf tissue glabrous; involucres not immersed, in plane of frond, entire to ± denticulate along margins, acute at tip, to 3 (4) mm long, 2 mm broad, 1–2 along acroscopic side of pinnae; $n = 56$ (Jam.).

Epiphytic in Lower Montane and Montane rain forests, Evergreen Cloud Forest, scattered in Northern Highlands, Central Plateau, Sierra Madre; 900–2700 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R.; S.A. (Ven. and Col. to Bol., s Braz.); Antill. CHIAPAS COLLECTIONS: *T&L 41438* (DS); *G 610* (BM, PH); *GM 178a* (DS); *R&B 20024* (US, DS); *EM 2909* (K, MEXU, US); *22038*; *25008A*; *25457B*; *30143*; *31479*; *31870*; *33586*.

11. Hymenophyllum (Sphaerocionium) hirsutum (L.) Swartz, J. Bot. (Schrader) 1800(2):99. "1801" [1802].

—*Trichomanes hirsutum* L., Sp. Pl. 2:1098. 1753. —*Sphaerocionium hirsutum* (L.) Presl, Hymenophyll. 34. "1843" [1844]. —TYPE: based on Plumier's Tract. Fil. Amer. pl. 50B, presumably representing a plant from the West Indies, probably either Martinique or Hispaniola.

Trichomanes ciliatum Swartz, Prodr. Veg. Ind. Occ. 136. 1788. —*Hymenophyllum ciliatum* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):100. "1801" [1802]. —*Sphaerocionium ciliatum* (Swartz) Presl, Hymenophyll. 34. "1843" [1844]. —TYPE: Jamaica, presumably *Swartz s.n.* (S?).

For additional synonymy, see Morton (1947).

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 6. 1909; Hooker & Greville, Icon. Fil. 1:pl. 35. 1827 [both of *H. ciliatum*].

Rhizome 0.2–0.3 mm diam.; fronds erect, determinate; stipe 1.5–3 (5) cm long, 0.3–0.4 mm diam., conspicuously alate (commonly at least to middle), bearing stalked, stellate hairs; blade ovate to oblong, 3–9 (15) cm long, 1.5–3 cm broad, not reduced at base, rachis broadly alate throughout; pinnae 6–12 pairs, spreading, 7–15 mm long, 5–12 mm broad, deeply pinnatifid; primary segments 2–5 pairs, all simple or the basal one or two bifid; ultimate segments linear, to 4 mm long, 1.0–1.3 mm broad; hairs on rachis, veins, and leaf margin stalked, stellate, mostly 3–4-rayed, or marginal ones bistellate or twice-forked; sori borne on most segments, valves suborbicular, ca. 1.5 mm long and broad, rounded; $n = 36$ (Jam.).

Epiphytic in Montane Rain Forest, Pine-Oak Forest; uncommon in Northern and Eastern highlands, SE corner of Central Plateau; 800–1600 m. Southern Mex. (Pue., Oax.), Guat., Hond., Nic., C.R.; S.A. (Ven. and Col. to Fr. Gui. and Bol., Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *R 1045* (PH); *32200*; *33009*; *33010b*; *42068*.

I am unable to distinguish *H. maxonii* Christ ex Morton (type from Guatemala). It is supposed to differ from *H. hirsutum* primarily by the thickness of the stipe (0.4–0.5 mm). At least one of the Chiapas specimens (*33009*) has stipes of this thickness and so by definition would have to be included in *H. maxonii*; however, I find that stipe diameters of these plants form a continuum.

12. Hymenophyllum (Sphaerocionium) lanatum Fée, Mém. Fam. Foug. 11:116, pl. 31, fig. 3. 1866.

—*Sphaerocionium lanatum* (Fée) Copel., Philipp. J. Sci. 67:31. 1938. —Type: Guadeloupe, Sainte-Rose, 1861, *L'Herminier s.n.* (presumably P; possible isotype BM!).

Illustrations: see original; Hooker & Greville, Icon. Fil. 1:pl. 84. 1828 [*Hymenophyllum hirsutum*]; Proctor, Fl. L. Antill. 2:66. 1977.

Rhizome 0.2 mm diam.; fronds pendent, determinate; stipe filiform, 1–3 cm long, 0.2 mm diam., inconspicuously alate at very apex, with stalked, stellate hairs (3–4-rayed); blade ovate to oblong-linear, 2–6 cm long, 1–1.8 cm broad, rachis narrowly alate throughout; pinnae 7–20 pairs, ascending, almost all simple and linear (a few bifid at apex or rarely pinnatifid with 2 pairs of segments), 8–11 mm long, 1.5–1.7 mm broad; hairs of leaf surfaces and veins abundant, stellate, stalked, mostly 5–6-rayed, the marginal bistellate, short-stalked, mostly 3–4-rayed; sori apical, involucres immersed at base, valves ca. 1 mm long and broad, rounded; $n = 36$ (Jam.).

Epiphytic in Montane Rain Forest; rare, se corner of Central Plateau; 1300 m. Southern Mex. (Oax.), Guat.; S.A. (Ven.); Antill. Chiapas Collection: *32223*.

13. Hymenophyllum (Sphaerocionium) microcarpum Desv., Mém. Soc. Linn. Paris 6:333. 1827.

—*Sphaerocionium microcarpum* (Desv.) Copel., Philipp. J. Sci. 67:34. 1938. —Type: "Habitat in Hispaniola?" [type specimen] collector not stated (P! photos BM! US). For additional synonymy, see Morton (1947:162).

Illustrations: Hooker, Sp. Fil. 1:pl. 32B. 1844 [*Hymenophyllum organense* Hook.]; Fée, Crypt. Vasc. Brés. 1:pl. 69, fig. 2. 1869 [*H. notabile* Fée].

Rhizome 0.3–0.5 mm diam.; fronds erect, determinate; stipe 3–9 cm long, 0.5 mm or more diam., terete at base, broadly alate upwards, with stellate hairs, these 3–4-rayed, stalked; blade ovate, 7.5–20 cm long, 4–10 cm broad, subtruncate at base, rachis broadly alate throughout; pinnae spreading to slightly ascending, 12–14 pairs, adnate, 2–5 cm long, 9–18 mm broad, deeply pinnatifid, costa broadly alate; pinnules 4–8 pairs, usually deeply pinnatifid, segments 2–3 pairs; ultimate segments 1–1.5 mm broad; hairs lacking on upper side of frond, those of rachis below stellate or often simple, those of margin almost all simple, reflexed; leaf tissue and veins glabrous below; valves of involucre ovate to oblong, 1.2–1.4 mm long, ca. 0.8 mm broad, acutish, scarcely immersed.

Epiphytic in Montane Rain Forest; uncommon in Northern Highlands, se corner of Central Plateau; 1100–1300 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Guy. and Bol., s Braz.); Gr. Antill., Dominica. Chiapas Collections: *GM s.n.* (DS); *R 962* (PH); *32215*; *35211*.

14. Hymenophyllum (Mecodium) myriocarpum Hook., Sp. Fil. 1:106, pl. 37D. 1844.

—*Mecodium myriocarpum* (Hook.) Copel., Philipp. J. Sci. 67:25. 1938. —Type: Colombia, *Hartweg 1530* (K! isotype BM!).

Illustration: see original.

Rhizome 0.15–0.2 mm diam.; fronds pendent, indeterminate; stipe very short, less than 2 (3) cm long, 0.15–0.2 mm diam., dark brown, brownish-alate (wings deciduous with age); blade ± linear, 6–30 cm long or more, 2–4 cm broad, 2–3-pinnatifid, rachis conspicuously alate (wings ca. 0.5 mm broad); pinnae frequently greatly elongate and pendent like the main axis, the lowermost reduced, becoming reddish brown with age, finally evanescent; ultimate segments ca. 1.0–1.3 mm broad, rounded at apex, plane (or only faintly undulate); veins and leaf tissue glabrous; involucres orbicular, ca. 1.2–1.5 (1.8) mm broad and long, containing numerous (10 or more) sporangia; receptacles obsolete and hence not exserted.

Epiphytic in Evergreen Cloud Forest; uncommon in Central Plateau, s Sierra Madre; 2700–3000 m. Southern Mex. (Pue., Ver., Oax.), Guat., Hond., Salv., Nic., C.R.; S.A. (Ven., Col., Ecu.). Chiapas Collections: *G 609* (PH); *JTM 1236* (US); *10016*; *14511*; *22040A*; *22058*; *22756*; *22939*; *31806*; *40036*; *41738*.

This species is easily separated from *H. undulatum* by the presence of a winged rachis, larger involucres containing a larger number of sporangia, and the less undulate-crispate segment margins; *Hymenophyllum myriocarpum* grows at much higher elevations, in Evergreen Cloud Forest. From *H. polyanthos,* it differs in the pendent blades with elongate pinnae and the more orbicular involucres; of the numerous Chiapas collections of *H. polyanthos,* only a single one (*22040B*) has been collected at elevations where *H. myriocarpum* occurs.

The distribution of *H. myriocarpum* is uncertain because of confusion with *H. undulatum* and other species. Probably it has a wide distribution in southern Central America and the South American Andes. A probable synonym is *H. andinum* v. d. Bosch, type from Ecuador, collector not stated (isotype K!)

15. Hymenophyllum (Mecodium) nigrescens Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:292. 1849.

—Type: Mexico, "omkring Chinautla i Dep. Puebla," *Liebmann* (C—2 sheets! I choose "Fl. Mexicana 537" as lectotype; isotypes BM! K! P!).

Hymenophyllum lehmannii Hieron., Bot. Jahrb. Syst. 34:428. 1904. —Type: Colombia, *Lehmann 7376* (B—photos BM!; isotypes K! P!).

Illustration: none found.

Rhizome ca. 0.3–0.5 mm diam.; fronds erect to arching, determinate; stipe 0.5–6 cm long, (0.2) 0.4–0.6 mm diam., alate in distal half (sometimes nearly to rhizome), brownish, glabrous; blade oblong-lanceolate, mostly (3) 5–8 cm long, 1–4 cm broad, deeply pinnate-pinnatifid to often 3-pinnate, rachis broadly alate throughout (wings 0.5 mm broad or more); pinnae spreading, lowermost slightly reduced, with winged costae; ultimate segments often somewhat pendent, ca. 1 mm broad or less, subacute to rounded, occasionally emarginate, plane to often slightly undulate; veins and leaf tissue glabrous; involucres ± orbicular, rounded at base and tip, ca. 1.2–1.5 mm long and broad, with several to many (to ca. 15) sporangia per sorus; receptacles obscure, not exserted.

Epiphytic in Evergreen Cloud Forest, rarely Montane Rain Forest; scattered in the Central Plateau, rare in Northern Highlands (Jitotol Ridge); (1700) 2300–2700 m. Southern Mex. (Oax.), Hond., Nic., C.R.; S.A. (Ven. and Col.). Chiapas Collections: *GM s.n.* (P); *12901*; *14390*; *22039*; *23097a*; *27675*; *32056*.

Type material of *H. nigrescens* is very poor, and I cannot be certain of the application of the name; the type may be depauperate *H. polyanthos*. Additionally, the relationship of *H. nigrescens* to *H. axillare* Swartz [J. Bot. (Schrader) 1800(2):101. "1801" (1802)], type from Jamaica, *Swartz s.n.* (fragment BM!), must be determined. I think it likely that the two species are conspecific; *H. axillare* has priority. Monographic study is needed.

Two other names often cited as synonyms of *H. nigrescens* are *Sphaerocionium nigricans* Presl ex Klotzsch [synonym, *Hymenophyllum nigricans* (Klotzsch) Kunze, 1847, not Colla, 1836], syntypes from Venezuela (*Moritz 268*, isosyntypes BM! K!; *Moritz 268b*, isosyntype BM!) and Peru (*Dombey 87*), and *H. laciniosum* Christ, syntypes from Costa Rica (*Wercklé s.n.*, P!) and Colombia (*Lehmann 3671*, P, not found; isosyntype K!). However, types of both of these species show much more elongate fronds than is typical for *H. nigrescens* from Mexico, and I think that they may represent a distinct species. Yet another name to be considered is *H. contextum* Rosenst. (Repert. Spec. Nov. Regni Veg. 22:3. 1925), syntypes from Costa Rica.

16. Hymenophyllum (Mecodium) polyanthos (Swartz) Swartz, J. Bot. (Schrader) 1800(2):102. "1801" [1802].

—*Trichomanes polyanthos* Swartz, Prodr. Veg. Ind. Occ. 137. 1788. —*Mecodium polyanthos* (Swartz) Copel., Philipp. J. Sci. 67:19. 1938. —Type: Jamaica, *Swartz s.n.* (isotype BM—photo UC).

Hymenophyllum millefolium Schlecht. & Cham., Linnaea 5:620. 1830. —Type: Mexico [Veracruz], Jalacingo, *Schiede & Deppe s.n.* (isotypes B—photo BM!; BM!).

Hymenophyllum jalapense Schlecht. & Cham., Linnaea 5:619. 1830. —Type: Mexico [Veracruz], near Jalapa, *Schiede & Deppe s.n.* (isotype BM!).

Hymenophyllum botryoides v. d. Bosch, Ned. Kruidk. Arch. 5(3):160. 1863. —Type: Mexico, "*Gelcotti N. 5394*" [no doubt *Galeotti 6394*] (holotype K?—photo BM!).

Illustrations: Hooker & Greville, Icon. Fil. 2:128. 1829; Rovirosa, Pterid. Sur Mex. pl. 6. 1909.

Rhizome 0.3–0.5 mm diam.; fronds arching, determinate; stipe mostly 1–6 cm long, 0.3–0.6 mm diam., brownish, nonalate to narrowly alate most of length, glabrous; blade deltoid-ovate, mostly 5–14 (20) cm long, 2.5–6 cm broad, deeply 3–4-pinnatifid, rachis narrowly alate throughout (wings mostly 0.1–0.2 mm broad); pinnae oblique-spreading, the basal few (1–4 pairs) sometimes reduced and apart; ultimate segments ca. 1 mm broad, rounded to emarginate at apex, plane; veins and leaf tissue glabrous; involucres ovate, usually acutish at base and apex (occasionally rounded at apex), mostly (1.2) 1.5–2.0 mm long, 0.8–1.2 mm broad, containing numerous sporangia; receptacle included; $n = 28$ (Jam., Jap., Fiji, New Hebrides).

Epiphytic, infrequently on rocks, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, infrequently Evergreen Cloud Forest, Seasonal Evergreen Forest; very common in Northern and Eastern highlands, Sierra Madre, Central Plateau; 600–2300 (2700) m. Southern Mex. (Oax., Pue., Ver.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. to Bol. and Sur., Braz.); Antill.; Afr., E Asia. Chiapas Collections: *MC 2332* (MEXU, US); *Dr 1595* (MEXU, US); *R 1046* (PH); *GM 88* (DS, US); *X&S X-435* (US); *X&S 433* (US); *T&L 41440* (DS); *T&L 41696* (DS); *9413*; *12972*; *14970*; *21227*; *21484*; *21655*; *21790*; *21791*; *21857*; *22040B*; *22386*; *22659*; *24865*; *25005*; *25455*; *25456*; *25457*; *27431*; *27987*; *29573*; *29653*; *29869*; *30058*; *30083*; *30911*; *31379*; *31544*; *32115*; *32227*; *32419*; *32526*; *32648*; *33032*; *33569*; *35233*; *42065*.

An extremely polymorphic and widespread species and thus described many times. *Hymenophyllum polyanthos* is by far the commonest species of its genus at middle elevations in Chiapas.

Hymenophyllum costaricanum v. d. Bosch (Ned. Kruidk. Arch. 5(3):161. 1863) reportedly differs from *H. polyanthos* by the nonalate stipes and tendency for isolated pinnae to become elongate. Several Chiapas collections, especially some from higher elevations (e.g., *33083*, *33569*, *22040B*) would fall under this circumscription. However, I am not at all convinced that these differences are sufficient for recognition of two species. Presence or absence of stipe alae seems to be correlated to some extent with frond size: more robust fronds lack alae. One can often find both types of fronds in the same collection. A probable isotype of *H. costaricanum* (Costa Rica, Volcán Barba, *Hoffmann s.n.*, UC!) was annotated recently by Lellinger as *H. polyanthos*.

17. Hymenophyllum (Sphaerocionium) pulchellum Schlecht. & Cham., Linnaea 5:618. 1830.

—*Sphaerocionium pulchellum* (Schlecht. & Cham.) Presl, Hymenophyll. 34. "1843" [1844]. —Type: Mexico [Veracruz], "prope Jalacingo," *Schiede & Deppe s.n.* (isotype BM!).

For additional synonymy, see Morton (1947:150).

Illustration: none found.

Rhizome 0.15–0.3 mm diam.; fronds pendent, indeterminate; stipe filiform, mostly 0.1–0.5 mm diam., nonalate throughout, with short-stalked, stellate hairs (mostly 4-rayed); blade oblong to linear, 2–20 (50) cm long, (1) 1.5–2.5 (4.5) cm broad, rounded at apex, rachis not alate or uppermost pinnae slightly decurrent; pinnae ascending, 4 to many pairs (normally 15–25), lowermost reduced, all but uppermost short-petiolulate, to 2.5 cm long, 1.4 cm broad, pinnatifid, costa continuously winged on both sides; segments (4) 5–7 pairs, basal bifid or rarely quadrifid, ultimate segments 0.7–1.0 (1.5) mm broad; hairs of rachis, veins, and leaf margin rather dense, nearly all stellate, sessile, 3–6-rayed; leaf tissue glabrous; sori borne on apical segments of pinnae only, involucres scarcely immersed at base, valves hemispheric, 0.7–1.0 mm long, 0.9–1.0 (1.4) mm broad.

Epiphytic (occasionally on wet, mossy rocks) in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern and Eastern highlands, SE corner of Central Plateau; 800–1700 m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic., C.R.; S.A. (S Braz.). Chiapas Collections: *Dr 1694* (MEXU, UC, US); *22384*; *32446*; *32518*; *33031*; *36966*.

18. Hymenophyllum (Sphaerocionium) sieberi (Presl) v. d. Bosch, Ned. Kruidk. Arch. 4:414. "1859" [1858].

—*Sphaerocionium sieberi* Presl, Hymenophyll. 58. "1843" [1844]. —Type: Martinique, *Kohaut s.n.* (Sieber exsicc. 71).

Hymenophyllum wercklei Christ, Bull. Herb. Boissier (2)4:940. 1904. —Lectotype (chosen by Morton, 1947:179): Costa Rica, *Wercklé 247* (presumably P, not found; isolectotype US).

Illustration: none found.

Rhizome 0.3–0.5 mm diam.; fronds pendent, indeterminate; stipe 1.5–8 cm long, 0.4–0.5 mm diam., conspicuously alate above middle, with simple, forked, or stellate (3-rayed) hairs; blade linear, 12–55 cm long, 2.5–8 cm broad, rachis alate throughout; pinnae close, subimbricate, 2–3 (5) cm long, to 1.8 cm broad at base, rather shallowly pinnatifid; primary segments 5–13 pairs, these mostly minutely bifid at apex, ultimate segments very short, 2 mm long or less, less than 1 mm broad; hairs of leaf surfaces and veins few, stellate, 3–5-rayed, subsessile, marginal ones forked or stellate (3-rayed), rather long-stalked; indusia slightly immersed at base, valves longer than broad, ca. 1.5 mm long.

Epiphytic? or on rocks, in Montane Rain Forest; rare in Northern and Eastern highlands; 800 m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R.; P.R., L. Antill. Chiapas Collections: *GM s.n.* (UC); *GM 11* (DS, US); *32954*.

19. Hymenophyllum (Mecodium) siliquosum Christ, Bull. Herb. Boissier (2)4:938. 1904.

—*Mecodium siliquosum* (Christ) Copel., Philipp. J. Sci. 67:26. 1938. —Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:716. 1977): Costa Rica, *Wercklé 307* (P! isolectotype CR).

Illustration: none found.

Rhizome ca. 0.2–0.5 mm diam.; fronds erect or arching, determinate; stipe mostly 1–3 cm long, 0.3–0.4 mm diam., narrowly to not alate, glabrous; blade oblong-lanceolate, mostly 2–4 (5) cm long, 1.5–3.0 cm broad, deeply pinnate-pinnatifid to bipinnate, rachis narrowly alate throughout, wings 0.1–0.2 mm broad; pinnae spreading, lowermost slightly reduced, with winged costae; ultimate segments ca. 0.7–0.8 mm broad, subacute, plane; veins and leaf tissue glabrous; involucres oblong-ovate, acute at base, rounded to subacute at tip, densely clustered at frond apex, ca. 2.5 mm long, 1.5 mm broad, with numerous sporangia; receptacles stout, to 3 mm long, often exserted.

Epiphytic in Montane Rain Forest, Pine-Oak-Liquidambar Forest; rare in Eastern Highlands, se corner of Central Plateau; 800–1300 m. Southern Mex. (Chis. only), C.R. Chiapas Collections: *22385*; *29908*; *36969*.

Chiapas specimens agree well with collections I have seen from Costa Rica. The sori are localized at the frond apex and have thick, exserted receptacles; pinnae segments are narrower than in other species of subg. *Mecodium* and are arranged in a more flabellate manner. This seems to be a very distinct species, related to *H. brevistipes*.

20. Hymenophyllum (Sphaerocionium) trapezoidale Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:293. 1849.

—Type: Mexico, Dept. Puebla, Chinautla, *Liebmann s.n.* (C—2 sheets!; I choose "Fl. Mexicana 528" as lectotype).

Hymenophyllum apterum v. d. Bosch, Ned. Kruidk. Arch. 5(3):194. 1863. —Lectotype (chosen by Morton, 1947: 167): Mexico [Veracruz], "Cuestra grande de Jalacingo," *Schiede s.n.* [No. 810, pt.].

Illustration: **Fig. 44.**

Fronds pendent, determinate; stipe 1.5–8 (18) cm long, (0.3) 0.4–0.6 mm diam., nonalate, sparsely pilose, hairs simple or forked; lamina linear or linear-lanceolate, 10–30 cm long, 2–6 cm broad, attenuate at apex, rachis alate above middle, nonalate below; pinnae ascending, 10–25 pairs, 1–4 cm long, 7–18 mm broad, deeply pinnatifid; segments 4–7 pairs, the upper basal deeply pinnatifid; ultimate segments broadly linear, 1.0–1.5 mm broad; hairs of rachis and veins stellate, 3- or 4-rayed, stalked, marginal hairs mostly forked or stellate, 3-rayed; leaf tissue glabrous; involucres rather deeply immersed at base.

Epiphytic in Montane and Lower Montane rain forests; uncommon in Northern Highlands, se corner of Central Plateau; 900–1700 m. Southern Mex. (Ver., Pue., Méx., Mlos., Oax.), Guat.; S.A. (Col., Sur.). Chiapas Collections: *GM 179* (DS); *22389*; *29589*; *30899*; *31478*; *32245*; *32388*; *35242*.

21. Hymenophyllum (Hymenophyllum) tunbridgense (L.) J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:418. 1793.

—*Trichomanes tunbridgense* L., Sp. Pl. 2:1098. 1753. —Type: uncertain; LINN 1253.4, pt., and 1253.5 are this species but, according to Jackson (1912), were added to LINN after 1755; several illustrations also cited.

Illustrations: Wherry, Southern Fern Guide 231. 1964; Knobloch & Correll, Ferns Chih. 44. 1962.

Rhizome 0.2–0.3 mm diam.; fronds arching or erect, determinate; stipe mostly 1–3 cm long, 0.3 mm diam., inconspicuously and very narrowly alate at apex, glabrous; blade ovate-lanceolate, mostly 2.5–5 cm long, 1.2–2.5 cm broad, lowest pinnae not or scarcely reduced, rachis narrowly alate; pinnae mostly 5–10 pairs, spreading to ascending, twice deeply pinnatifid; ultimate segments mostly 3–5 mm long, 0.7–1.0 mm broad, remotely serrulate at margin; rachis, veins, and leaf tissue glabrous or with a few appressed, short (ca. 0.1–0.2 mm), cylindrical hairs on rachis and veins; involucres not immersed, mostly toward frond apex, often not in plane of frond, campanulate, denticulate along margins, denticulate to fimbriate at apex, to 2 mm long, 1.2 mm broad; $n = 13$ (Britain, Tristan da Cunha).

Epiphytic or on rocks in Evergreen Cloud Forest, less often Montane Rain Forest; uncommon on higher peaks in Central Plateau, Sierra Madre; 1500–2800 m. Mexico (Chih., Oax.), Guat., C.R.; Jam., Hisp.; U.S. (S.C.); S.A. (Ven., nw Arg., Chile); w Eur.; Afr.; N.Z., Austral.? Chiapas Collections: *GM 107* (DS); *JTM 1235* (US); *L&S 9949* (US); *10019*; *14530*; *30078*; *30134*; *31434*; *31435*; *32039*.

22. Hymenophyllum (Mecodium) undulatum (Swartz) Swartz, J. Bot. (Schrader) 1800(2):101. "1801" [1802].

—*Trichomanes undulatum* Swartz, Prodr. Veg. Ind. Occ. 137. 1788. —*Mecodium undulatum* (Swartz) Copel., Philipp. J. Sci. 67:26. 1938. —Type: Jamaica, presumably *Swartz s.n.* (probable isotypes BM, L—photo UC).

Illustrations: Hooker, Icon. Pl. 10:964. 1854 (poor); Hedwig, Fil. Gen. et Sp. pl. 11, pt. 1799 (good).

Rhizome ca. 0.2 mm diam.; fronds pendent, indeterminate; stipe 3–5 cm long or more, 0.2 mm diam., blackish, nonalate, glabrous; blade linear, 10–25 cm or more long, mostly 1.5–2.5 cm broad, broader if greatly elongate pinnae present, 2–3-pinnatifid, rachis essentially nonalate; pinnae oblique, costal wing decurrent, lowermost ultimately turning reddish brown, then evanescent, some lower and middle pinnae often greatly elongate (to 15 cm); ultimate segments ca. 1.0 mm broad, rounded or emarginate at apex, ± plane to usually undulate; veins and leaf tissue glabrous; involucres rounded at tip and base, broader than long, ca. 1.0 mm broad, 0.6–0.8 mm long, containing few (2–5) sporangia; receptacles obsolete, hence not exserted; $n = 28$ (Jam.).

Epiphytic in Montane Rain Forest; rare, se corner of Central Plateau; 1300 m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R.; S.A. (Ven., Col., Ecu.); Jam., Cuba, Guadeloupe. Chiapas Collections: *22383*; *36970*.

Readily distinguished by the long, pendent habit, nonalate rachis, irregular lateral pinna development, and small (broader than long) involucres. The Chiapas specimens agree well with material I have seen from Jamaica.

The closest relatives of *H. undulatum* are *H. myriocarpum* on the one hand and *H. contortum* on the other. *Hymenophyllum myriocarpum* in Chiapas occurs at higher elevations than *H. undulatum*; *Hymenophyllum contortum,* which has more crispate fronds, has been collected with *H. undulatum.*

SPECIES TO BE LOOKED FOR IN CHIAPAS

Hymenophyllum (*Sphaerocionium*) *elegans* Spreng. —Guat., C.R., Pan., S.A. (Ven. and Col. to Bol., s Braz.), Antill., Trin. Hairs lacking on leaf surface, stipe delicate, less than 0.3 mm diam.; rachis not alate to base; pinnae sessile or adnate, subflabellate, with mostly 1–2 pairs of segments.

Hymenophyllum (*Sphaerocionium*) *lineare* (Swartz) Swartz —Guat., C.R., Antill. Hairs lacking on leaf surface and veins; stipe 0.2–0.3 mm diam.; rachis not alate to base; lower pinnae petiolulate; marginal hairs simple or forked at the base.

Hymenophyllum (*Sphaerocionium*) *trichophyllum* H.B.K. —Guat., C.R., Pan., S.A. (Guy. to Bol.). Similar to *H. elegans* and *H. lineare,* but the pinnae petiolulate, hairs borne on veins as well as margin.

49. HYPOLEPIS

Hypolepis Bernhardi, Neues J. Bot. 1(2):34. "1806" [1805]. —TYPE: *Hypolepis tenuifolia* (Forst.) Bernh. [≡*Lonchitis tenuifolia* Forst.].

Plants terrestrial; rhizome long-creeping, solenostelic, clothed with dark, multicellular hairs; fronds mostly large, bipinnate or usually more compound, hairy or glabrous, erect or scandent; stipe with numerous vascular bundles, spiny or not; veins free; sori usually almost marginal, oblong to round, usually partially covered by the reflexed margin, sometimes inframarginal and naked, terminal on the veins; spores oblong, spinulose or tuberculate, rarely smooth, without a perispore; $x = 29, 52$ (most species).

Copeland (1947) attributed about 45 species to the genus, which is distributed pantropically. In the New World, there are perhaps 15–20 species, ranging from Florida, the West Indies, and southern Mexico to southern Brazil and Chile. A revision of the species is badly needed. The five Chiapas species are fairly distinct.

The affinities of *Hypolepis* are apparently with *Paesia* and *Pteridium,* as the chromosome base numbers ($x = 52$) and general morphology indicate. Reports of $n = 29$ for *H. nigrescens* are not easily reconcilable with other counts for *Hypolepis* spp. and indicate that *Hypolepis* as presently circumscribed may be unnatural.

a. Stipe and rachis prickly or spiny; lowermost pinnae usually opposite.
  b. Spines retrorse; penultimate axes with wings perpendicular to plane of frond above .... 3. *H. nigrescens*
  bb. Spines spreading, erect; penultimate axes without perpendicular wings above.
    c. Indusia blackish; fronds drying brownish; rachis very sparingly spiny .... 2. *H. melanochlaena*
    cc. Indusia stramineous to tan; fronds drying greenish; rachis moderately spiny .... 5. *H. repens*
aa. Stipe and rachis without spines, sparingly to densely pubescent and sometimes rough to touch.
  d. Axes reddish purple; sori exindusiate, inframarginal .... 4. *H. pulcherrima*
  dd. Axes stramineous to tan or brownish; sori indusiate, marginal .... 1. *H. bogotensis*

1. **Hypolepis bogotensis** Karst., Fl. Columb. 2:91, pl. 147. 1865.

—TYPE: Colombia, "Cordillerae Bogotensis," *Karsten s.n.* (LE, photo GH; isotype B).

Dennstaedtia munchii Christ, Bull. Herb. Boissier (2)5:732. 1905. —TYPE: Mexico, Chiapas, San Pablo, 2300 m, *Münch 137* (presumably P, not found). According to Tryon (Rhodora 63:71. 1961), *Münch 76* (fragment US from DS!) is probably type material that was incorrectly numbered; the locality and elevational data are the same.

ILLUSTRATION: Tryon, Contr. Gray Herb. 194:37, fig. 14. 1964.

Fronds erect, not scandent, ca. 1(ours)–2 m long; stipe and rachis stramineous to reddish brown, without spines but rough to touch because of persistent bases of trichomes; blade deltoid, 3-pinnate-pinnatifid (ours) to 5-pinnate-pinnatifid, subdichotomous at base; lowermost pinnae much the longest, strongly inequilateral with basiscopic pinnules longer than acroscopic ones; penultimate axes not or inconspicuously alate, without adaxial wings; costae and costules below with rather dense, thin, flexuous, septate hairs, with similar hairs on ultimate midribs and veins; leaf tissue below sparsely to densely hairy, light green or yellowish green; sori usually at end of an acroscopic vein at or just above sinus; indusia large, flaplike, whitish to tan, glabrous, ± entire (ours) to erose.

Cut-over woods and pastures, adjacent to Evergreen Cloud Forest; uncommon in s Sierra Madre, highest peaks of Central Plateau; (2300) 2800–3000 m. Southern Mex. (Oax.), Salv., C.R.; S.A. (Col. to Bol.); Jam. CHIAPAS COLLECTIONS: *GM 76* (DS, US); *G 230* (BM, K, YU); *22056*; *22777*; *31732*.

Chiapas collections differ from those of South America primarily in being not so densely hairy. However, the hair type is basically the same, and other morphological features seem to agree perfectly, so I do not hesitate to refer these collections here. In several herbaria there are specimens identified as *H. jamaicensis* Maxon, which is an unpublished name. These seem to me in no way different from Chiapas collections I have called *H. bogotensis*.

A chromosome number from *31732* showed ca. 50 II + 54 I at diakinesis, with abortive spores. The spores of other Chiapas collections seem well formed.

2. **Hypolepis melanochlaena** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:221, fig. 7, D–E. 1975.

—Type: Mexico, Chiapas, *Münch 35* (DS! probable isotype DS!).

Illustration: only the original.

Complete fronds not seen, probably subscandent; rachis tan to brownish, glabrous, sparingly aculeate, spines patent, straight; blade 3-pinnate-pinnatifid, dissected as in *H. repens*; pinnae alternate, equilateral, largest more than 35 cm long, 10 cm wide; penultimate axes not alate, straight, without adaxial wings; costae and costules below completely glabrous; leaf tissue below glabrous, drying greenish brown to blackish; sori 1–2 pairs per ultimate segment; indusia flaplike, entire, drying blackish.

Known only from the type, without exact locality or habitat data.

Morton identified the probable isotype as *H. nigrescens*, but that species has very little to do with *H. melanochlaena*. Rather, it seems more closely related to *H. repens*, but even that affinity is not certain.

3. **Hypolepis nigrescens** Hook., Sp. Fil. 2:66, pl. 90C. 1852. [plate published in 1851]

—Syntypes: Jamaica. *Wilson s.n.*, *Wiles s.n.*, *Purdie s.n.*; Venezuela. Caracas, *Linden 5* and *6*; Philippines. Luzon, *Cuming 271* (K; isosyntypes of *Wilson s.n.* and *Wiles s.n.* at BM!).

Illustration: **Fig. 45.**

Fronds scandent, to 10 m long; stipe and rachis stramineous to brownish, sparsely hairy, rather densely aculeolate, at least some spines retrorse; blade 3-pinnate-pinnatifid to 4-pinnate-pinnatifid; lowermost pinnae opposite, equilateral, to ca. 1 m long; penultimate axes alate, slightly flexuose, adaxially with wings perpendicular to plane of frond; costae and costules below with scattered, stiff, stout, septate hairs; ultimate midribs and veins with thinner, flexuous, septate hairs; leaf tissue glabrous below, dark green or drying brownish; sori usually at the end of an acroscopic vein at or just above sinus; indusia small, flaplike, greenish to tan, glabrous, erose to subentire at margin; $n = 29$ (Oax., Jam.).

Climbing into trees at the edges of woods in Montane Rain Forest, rarely Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1300–2300 m. Southern Mex. (Ver., Oax.), Guat., C.R.; S.A. (Ven., Bol.); Gr. Antill. Chiapas Collections: *T&L 41443* (DS); *GM 158* (DS, US); *P 6710*, pt. (PH); *23174*; *23212*; *31961*; *32214*; *33616*.

Hypolepis hispaniolica Maxon, type from Haiti, seems doubtfully distinct from *H. nigrescens*, which is one of the more distinctive species of *Hypolepis* in the New World. Its chromosome number is anomalous with the other numbers reported in the genus and may be evidence of the unnaturalness of *Hypolepis* as currently circumscribed.

4. **Hypolepis pulcherrima** Underw. & Maxon, Proc. Biol. Soc. Wash. 43:84. 1930.

—Lectotype (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:716. 1977): Jamaica, Blue Mt. Peak, *Maxon 9912* (US).

Illustration: none found.

Fronds apparently erect, not scandent, ca. 1 m long (or less?); stipe and rachis atropurpureous, glabrescent, without spines but rough to touch because of persistent hair bases; blade to 3-pinnate-pinnatifid; lowermost pinnae alternate, apparently equilateral, to ca. 25 cm long; penultimate axes slightly alate, straight, without adaxial wings; costae and costules below with scattered, flexuous, septate hairs; ultimate midribs and veins with a few similar hairs; leaf tissue below glabrous, green, very thin; sori terminating an acroscopic vein on a basal lobe usually slightly back from margin; indusia absent or very weakly developed, greenish, barely (if at all) reflexed.

In Chiapas, known only from a single collection without habitat data; presumably high elevations in the Central Plateau ("Baduitz"). Southern Mex. (Chis. only?), C.R.; Jam., Hisp. Chiapas Collection: *GM 111* (DS, US).

Ghiesbreght 366 (BM, K) is possibly this species, but the specimens are too incomplete to be certain. These specimens completely lack flexuous, septate hairs on the axes below but otherwise agree with *H. pulcherrima* in the naked sori and atropurpureous axes.

5. **Hypolepis repens** (L.) Presl, Tent. Pterid. 162. 1836.

—*Lonchitis repens* L., Sp. Pl. 2:1078. 1753. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:130. 1977): Plumier's Tract. Fil. Amer. pl. 12, 1705, illustrating a plant from Martinique.

Hypolepis mexicana Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:260. 1849. —Type: Mexico, Oaxaca, "Hacienda de Sta. Gertrudes," *Liebmann* [Liebm. Pl. Mex. 2751, Fl. Mex. 801, 803, s.n.] (C!—folio herb.; isotype BM!). I choose no. 803 as lectotype.

Illustrations: Hooker, Sp. Fil. 2:pl. 90B. "1852" [1851]; Proctor, Fl. L. Antill. 2:131. 1977.

Fronds subscandent, to 6 m long; stipe and rachis stramineous to tan, glabrescent to sparsely hairy, the spines mostly patent, straight; blade 3-pinnate-pinnatifid to 4-pinnate; lowermost pinnae opposite, to 75 cm long, equilateral; penultimate axes not alate, straight, without adaxial wings; costae and costules below with scattered, flexuous, hyaline to whitish, septate hairs with similar but thinner and shorter hairs on ultimate midribs and veins; leaf tissue glabrous below, greenish; sori usually on both sides of larger ultimate segments, above the sinus; indusia rather large, flaplike, whitish, subentire to erose to fimbriate with septate trichomes; $n = 52$ (C.R.), 104 (Fla.).

Edges of Montane Rain Forest, Pine-Oak-Liquidambar, Evergreen Cloud Forest; uncommon in Northern Highlands, Central Plateau, s Sierra Madre; 1700–2700 m. Southern Mex. (Oax., Hgo., Ver.), Bel., Guat., Salv., Nic., C.R., Pan.; S.A. (Fr. Gui., Sur., Ven., Col., Braz.); Fla., Antill., Trin. Chiapas Collections: *R 816* (PH); *P 6710* (UC, US); *P 6868* (UC, US); *P 7228* (UC); *T 1970* (DS, US); *22643*; *32362*; *34809*; *40874*.

The name *Hypolepis mexicana* has been applied to specimens with fimbriate indusia (e.g., *P 6710*; *T 1970*). It is possible that this is a distinct species, but

I can find no other differences that would separate it. Even if there are two species here, another name must be found, since the type of *H. mexicana* has an entire to only slightly erose indusium and in my opinion is the same as typical *H. repens.* Maxon applied the name *H. fimbriata* (ined.) to specimens in several herbaria that have a fimbriate indusium (Jam., C.R., and s Mex.). I have not been able to find a validly published name that applies to these specimens.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Hypolepis stuebelii Hieron. —Ver., Jam., Hisp., S.A. (Ven. and Col. to Peru). Distinguished from all other Chiapas species by the rather densely setose leaf tissue below, the hairs rigid, acicular, unicellular or few-celled; indusia long-ciliate; stipe and rachis spiny.

50. JAMESONIA

Jamesonia Hook. & Grev., Icon. Fil. 2:pl. 178. 1830. —TYPE: *Jamesonia pulchra* Hook. & Grev.

Rhizome slender, long- or moderately long-creeping, densely clothed with tan to black, bristlelike trichomes of 1–5 cells at the base; fronds linear, usually 15–60 cm long, seldom exceeding 90 cm long, less than 5 cm broad, indeterminate or sometimes determinate, usually 1-pinnate; pinnae small, usually not exceeding 1 cm in either length or breadth, mostly imbricate in 2 ranks, ±-tomentose, especially lower surface, or glandular, margin incurved or inrolled, often coriaceous; veins free, dichotomous, branches unequal; sporangia on veins in basal portion of pinna or extending to distal portions and obscuring lower surface of pinna, sometimes immersed in tomentum on lower pinna surface; spores tetrahedral-globose, with a prominent equatorial flange, distal face with 3 ridges forming a triangle; $x = 87$ (from $x = 29$?).

Jamesonia is a Neotropical genus of 19 species, occurring primarily in paramos and cool, wet highlands from southern Mexico to central Bolivia and in southeastern Brazil. According to Tryon (1962), the species in the genus may have evolved from *Eriosorus,* possibly along two or more different lines. A single species occurs in Chiapas.

REFERENCE: TRYON, A. F. 1962. A monograph of the fern genus *Jamesonia.* Contr. Gray Herb. 191:109–197.

1. **Jamesonia alstonii** A. F. Tryon, Contr. Gray Herb. 191:168, fig. 11. 1962.

—TYPE: Colombia, Dept. del Valle, Cordillera Occidental, Los Farallones, La Laguna, *Cuatrecasas 21884* (GH; isotypes COL, US).

ILLUSTRATIONS: **Fig. 41**; Tryon, Contr. Gray Herb. 194:57, fig. 30. 1964.

Rhizome long-creeping, sometimes compact, with trichomes rigid, appressed, usually dark brown or blackish, ca. 1.5–2.5 mm long; stipe terete, 2–6 cm long, 1/10–1/5 as long as blade, atropurpureus, ca. 1–2 mm diam. at apex, sparsely pubescent; tomentum of blade apex and rachis yellow or tan; blade 15–40 cm long, 0.4–1.0 cm wide, about the same breadth throughout or base slightly narrowed, with ca. 100–450 pinnae, indeterminate, apical bud larger than mature pinnae, with appressed trichomes; rachis atropurpureous, tomentose, trichomes usually exceeding length of pinnae, tan or stramineous, apical cell acuminate or bulbous; pinnae short-stalked ca. 0.5 mm, ovate-cordate or orbicular-cordate, inequilateral at base, not auriculate, 3.5–4.5 mm long, 2–5 mm wide, yellow-green, coriaceous; upper surface glabrous, rarely glandular, lower surface with sparse short trichomes having a bulbous terminal cell, usually with a tuft of longer trichomes on pinna stalk and adjacent veins; sporangia abundant, usually obscuring lower pinna surface; spores light amber, smooth or slightly papillose especially on proximal face.

Flat meadows and steep slopes with *Pinus, Juniperus,* and *Buddleia*; s Sierra Madre, near summit of Vol. Tacaná; 3600 m. Southern Mex. (Oax.); Guat., Nic., C.R.; S.A. (Col. to Bol.). CHIAPAS COLLECTIONS: *EM S-234* (GH, K, NY, US, only the last two seen); *EM 2864* (GH, K, NY, US, only the last two seen); *24314*.

51. LASTREOPSIS

Lastreopsis Ching, Bull. Fan Mem. Inst. Biol., Bot. Ser. (8)9:157. 1938. —TYPE: *Lastreopsis recedens* (J. Smith ex T. Moore) Ching [≡*Lastrea recedens* J. Sm. ex T. Moore] = *Lastreopsis tenera* (R. Br.) Tindale.

Polystichum sect. *Parapolystichum* Keyserling, Pol. Cyath. Hb. Bung. 11. 1873. —*Dryopteris* subg. *Parapolystichum* (Keyserling) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:93. 1920. —*Parapolystichum* (Keyserling) Ching, Sunyatsenia 5:239. 1940. —TYPE: uncertain, original publication not seen.

Plants terrestrial, rarely epiphytic; stipe containing several (4 or more) vascular strands, with 2 prominent ridges on upper surface, the channel between them clothed toward apex as on rachis; rachis bordered above by 2 prominent ridges that are continuous with the thickened leaf margin of ultimate segments of pinnae, intervening channel almost filled by a slightly raised median portion, this median portion rarely glabrous, mostly clothed with *Ctenitis*-hairs (short, articulated, unbranched, multicellular, reddish hairs); gemmiferous bulbils developed towards apex of main rachis in many species (including ours); blade mostly decompound, rarely 2-pinnate, quinquangular, with lowest pair of primary pinnae strongly basiscopically produced, catadromous throughout; basal basiscopic leaflet of primary or secondary pinnae displaced downwards and adnate to major axis next below; veins free, minor veinlets simple or forked; glandular hairs cylindrical to rarely round, bright yellow to red or rarely cream colored, scattered over abaxial surface of blade, costae, and costules; sori orbicular, rarely slightly oblong, up to 2 mm diam., indusiate or exindusiate; sporangia glabrous, pedicel long and narrow, usually with 1 or more oblong or rounded, red to yellow, stalked glands; indusia, if present, brown to rarely black, sometimes glandular; spores bilateral, monolete, with a crested perispore; gametophytes cordate; *x* = 41.

Lastreopsis is a pantropical genus of about 33 species, with 5 species native to the Neotropics. The greatest number of species occurs in eastern Australia (11). Most species are found in tropical or subtropical rainforests, but a few (Austral. and N.Z.) occur in temperate rainforests dominated by *Nothofagus*. The affinities of *Lastreopsis* are thought to be with *Ctenitis* and *Polystichopsis* (Tindale, 1965).

REFERENCES: CHRISTENSEN, C. 1920. A monograph of the genus *Dryopteris*. Part II. The tropical American bipinnate-decompound species. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:1–132. 1920; TINDALE, M. 1965. A monograph of the genus *Lastreopsis* Ching. Contr. New South Wales Natl. Herb. 3:249–339.

a. Sori indusiate; blade 15–30 (40) cm long, 9–15 (20) cm broad, to 3-pinnate-pinnatifid . . . 2. *L. exculta* ssp. *guatemalensis*
aa. Sori exindusiate; blade larger, to 1 m long and broad, 3-pinnate to 4-pinnate-pinnatifid . . . . 1. *L. effusa*
  b. Fronds dark green, 4-pinnate to 4-pinnate-pinnatifid; secondary pinnules more dissected than in ssp. *divergens*; ultimate segments acute . . . . 1a. *L. effusa* ssp. *dilatata*
  bb. Fronds dull grayish-green or dark green, 3-pinnate to 3-pinnate-pinnatifid (ours); secondary pinnules with a broad, uncut center; ultimate segments obtuse to acutish . . . . 1b. *L. effusa* ssp. *divergens*

1a. **Lastreopsis effusa** (Swartz) Tindale ssp. **dilatata** (Liebm.) Tindale, Contr. New South Wales Natl. Herb. 3:299. 1965.

—*Polypodium dilatatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:208. 1849. —SYNTYPES: Mexico. Veracruz, "pr. Mirador," 11/41, *Liebmann* [Liebm. Pl. Mex. 2674, Fl. Mex. 723]; "Hac. de Mirador," 7/41, *Liebmann* [Liebm. Pl. Mex. 2674, Fl. Mex. 724]; Oaxaca, "Trapiche de la Concepcion," 7/42, *Liebmann* [Liebm. Pl. Mex. 2675, Fl. Mex. 722] (all C!—folio herb.). I choose Fl. Mex. 723 as lectotype.

ILLUSTRATIONS: Hieronymus, Hedwigia 46:pl. 7, fig. 18. 1907 [as *Dryopteris ulvensis* Hieron.]; Sloane, Nat. Hist. Jam. pl. 57. 1705.

Rhizome short-creeping, apex clothed with several large, ovate or lanceolate, subentire or faintly toothed, generally appressed scales; stipes approximate, to 1 cm diam., 50–100 cm long, base with deciduous scales, upwards glabrous; blade deltoid, mostly 50–100 cm long and broad, 4–5-pinnate; primary rachis (rarely also the secondary) often with a scaly bud in axil of a distal pinna; basal pinnae largest, to 50 cm long, considerably produced basiscopically; pinnules stalked; penultimate segments with margin ± deeply pinnatifid into oblique or falcate, sharply acute lobes; leaf tissue above shining, glabrous except for the channelled axes filled with *Ctenitis*-hairs; lower surface with few glandular hairs, especially along secondary and tertiary rachises; sori exindusiate; receptacle with several shining red glands among the sporangia; *n* = 41, for the species (Jam.).

Slopes and ravines in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, Sierra Madre; 550–2100 m. Southern Mex. (Ver., Oax.), Guat., Hond., C.R., Pan.; S.A. (Ecu.); Cuba, Hisp. CHIAPAS COLLECTIONS: *GM 5* (DS); *P 6869* (UC, US); *MC 2111* (US); *22481*; *25062*; *25395*; *31508*; *32556*; *32835*; *32889*.

1b. **Lastreopsis effusa** (Swartz) Tindale ssp. **divergens** (Willd.) Tindale, Contr. New South Wales Natl. Herb. 3:299, pl. 21. 1965.

—*Polypodium divergens* Willd. in Schkuhr., Kr. Gew. 27, pl. 26b. 1809? —TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19725, 3 sheets).

ILLUSTRATIONS: Vareschi, Fl. Venez. 1(1):pl. 75. 1969 [as *Ctenitis effusa* (Swartz) Copel.]; Tindale (1965:pl. 21).

Similar to ssp. *dilatata*, differing mainly by the characters given in the key.

Steep ravines in Lower Montane Rain Forest; uncommon in Northern Highlands (not Jitotol Ridge); 550–700 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., Braz., Parag.); L. Antill., Hisp., Trin. CHIAPAS COLLECTIONS: *32834*; *38683*.

The type subspecies, from the Greater Antilles, is distinguished by the more abundant glands on the blade below and the glabrous secondary to quaternary rachises. A fourth subspecies, ssp. *confinis* (C. Chr.) Tindale, also occurs in the Greater Antilles and can be distinguished by its rather small fronds with blade usually 2-pinnate-pinnatifid.

2. **Lastreopsis exculta** (Mett.) Tindale ssp. **guatemalensis** (Baker) Tindale, Contr. New South Wales Natl. Herb. 3:245. 1963.

—*Nephrodium guatemalense* Baker *in* Hook. & Bak., Syn. Fil., ed. 2, 498. 1874. —*Dryopteris guatemalensis* (Baker) O. Ktze., Rev. Gen. Pl. 2:812. 1891. —*Dryopteris exculta* (Mett.) C. Chr. var. *guatemalensis* (Baker) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:96. 1920. —*Lastreopsis guatemalensis* (Baker) L. D. Gómez, Brenesia 8:50. 1976. —LECTOTYPE (chosen by Christensen, 1920:96): Guatemala, Choctum, *Salvin & Godman s.n.* (K!).

Aspidium chontalense Fourn., Bull. Soc. Bot. France 19:254. 1872. —*Lastreopsis chontalensis* (Fourn.) Lellinger, Proc. Biol. Soc. Wash. 89:716. 1977. —TYPE: Nicaragua, Chontales, *Lévy 516* (P—3 sheets! isotype fragm. US).

ILLUSTRATION: Mettenius, Abh. Senckenberg. Naturf. Ges. 2:pl. 17, fig. 9. 1858 [of *Aspidium excultum* Mett. ≡ ssp. *exculta*].

Rhizome long-creeping, 2–6 mm diam., clothed with scales that are brown, acuminate, entire, linear to narrowly lanceolate; stipe ca. 12–40 cm long, 0.4–2.0 mm broad near middle, scaly at base; rachis very narrowly winged toward middle and apex, gemmiferous by scaly bulbils near apex; blade 15–30 (40) cm long, 9–15 (20) cm broad, mostly 3-pinnate-pinnatifid; lowest pair of pinnae enlarged, basiscopically produced; secondary rachises very narrowly and evenly winged through all or most of their length; pinnules stalked to sessile; tertiary segments sessile, ± oblong, margin sharply toothed, apex acute, sometimes again dissected almost to midrib; costae and costules below with patent, 2–4-celled *Ctenitis*-hairs; glandular hairs densely clothing lower surface of rachis, costae, costules, veinlets, and blade surface; sori indusiate, orbicular; indusia 0.3–1 mm diam., orbicular-reniform, persistent, glabrous or sparsely glandular.

Habitat data lacking for Chiapas collections, probably lower elevation rain forests. Southern Mex. (Chis. only?), Guat., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *G 422* (K, US), a lectoparatype of *Nephrodium guatemalense*; *P 6724* (GH, NSW, UC, US, only the last two seen); *G 232A* (GH, not seen, cited by Tindale, 1965).

The type subspecies occurs in Venezuela and Colombia and is a somewhat larger plant than ssp. *guatemalensis*. *Lastreopsis exculta* ssp. *squamifera* (C. Chr.) Tindale, with the rachis and costae rather densely clothed with lanceolate scales, is known from Veracruz (one collection) and Costa Rica (Tindale, 1965).

52. LINDSAEA

Lindsaea Dryander *in* J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:401. 1793 (often misspelled "Lindsaya"). —TYPE: *Lindsaea trapeziformis* Dryander [=*L. lancea* var. *lancea*].

For additional synonymy, see Kramer (1957).

Plants mostly terrestrial, a few species epipetric, scandent, or epiphytic; rhizome creeping or slightly ascending, protostelic; rhizome scales lanceolate, entire, grading into hairlike scales; blade various, from simple to usually 1–2-pinnate, more dissected in a few species, anadromous; ultimate divisions usually dimidiate (asymmetrical); veins free (ours), connivent, or anastomosing without free included veinlets; sori terminal on veins, served by (1) 2 to many nerves, mostly very close to upper and outer margin; indusia lunate to linear, fixed at base and opening outwards; bicellular filiform paraphyses present in some (all?) species, these very small; spores tetrahedral, trilete-scarred (rarely monolete in Old World), 16–32 per sporangium; x = 34, 41, 47, 50.

According to Kramer (1971), *Lindsaea* consists of approximately 150 species; 45 are known from the Neotropics (Kramer, 1957), a few in Africa, and the rest from Southeast Asia to Japan and the southern Pacific islands (to Marquesas). The affinities of *Lindsaea* are with *Odontosoria* and *Sphenomeris,* and perhaps somewhat less with the dennstaedtioid ferns.

Lindsaea is primarily a genus of low- and middle-elevation rain forests. The greatest species concentration in the New World is from southeastern Colombia to French Guiana and northern Brazil; a secondary center is in southeastern Brazil. All of the Chiapas species are uncommon or rare, and their numbers may have been greatly reduced by deforestation activities. Many species of *Lindsaea,* including *L. lancea,* have the capacity to produce either simply pinnate or bipinnate fertile fronds; for this reason, frond dissection is often not a very usable diagnostic character. All three Chiapas species have wide ranges in the Neotropics.

REFERENCES: KRAMER, K. U. 1957. A revision of the genus *Lindsaea* in the New World. Acta Bot. Neerl. 6:97–290; 1971. *Lindsaea* group. Pp. 177–254 *in* Flora Malesiana (2)1.

a. Distal pinnules (of an individual pinna) but little reduced, not less than half as long as proximal ones, not or only by a very narrow wing connected with the terminal deltoid-lanceolate segment; distal part of stipe and rachis usually angular abaxially . . . . 2. *L. lancea* var. *lancea*

aa. Distal pinnules gradually reduced, much less than half as long as proximal ones, confluent with a small terminal segment; distal part of stipe and rachis abaxially terete or flattened.

  b. Distal part of stipe and rachis abaxially terete . . . . 1. *L. arcuata*

  bb. Distal part of stipe and rachis abaxially flattened . . . . 3. *L. quadrangularis* ssp. *antillensis*

1. **Lindsaea arcuata** Kunze, Linnaea 9:86. 1835.

—TYPE: Peru, Pampayaco, *Poeppig 1133* (LZ, destroyed; isotype B).

Lindsaea curvans Fée, Gen. Fil. 106. 1852. —TYPE: Mexico, Oaxaca, *Galeotti 6489* (P).

Lindsaea galeottii Fée, Gen. Fil. 107. 1852. —TYPE: Mexico, Oaxaca, *Galeotti 6469* (P).

ILLUSTRATIONS: Kramer (1957:199, fig. 55); Rovirosa, Pterid. Sur Mex. pl. 9. 1909 (as *L. trapeziformis*).

Similar to *L. lancea,* but stipe and rachis abaxially terete; blade bipinnate; pinnae gradually narrowed toward their tip, distal pinnules gradually shortened and much less than half as long as proximal ones, confluent with a small terminal segment; pinnules variable, trapezoidal, with a truncate apex, or acute, 3–3.5 times longer than wide; n = ca. 84 (Oax.), ca. 88 (Chis.).

In Lower Montane Rain Forest (probably also Tropical Rain Forest); uncommon in Northern Highlands; 900 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol., s Braz.); Cuba, Hisp. CHIAPAS COLLECTIONS: *GM s.n.* (PH, U, UC); *GM 7* (DS, US); *R 963* (PH); *31517*.

2. **Lindsaea lancea** (L.) Beddome, Ferns Brit. India Suppl. 6. 1876.

—*Adiantum lancea* L., Sp. Pl., ed. 2, 2:1557. 1763. —TYPE: based on Seba, Locupletissimi rerum naturalium thesaurus . . . II, p. 65, pl. 64, figs. 7–8, 1735, illustrating a plant from Surinam.

Lindsaea imbricata Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:269. 1849. —TYPE: Mexico, Oaxaca, San Pedro Tepinapa, *Liebmann* [Liebm. Pl. Mex. 2447, Fl. Mex. 450 and 450a] (C! photos US!). I choose as lectotype no. 450, the specimen annotated by Kramer as holotype.

For additional synonymy, see Kramer (1957).

ILLUSTRATIONS: **Fig. 46**; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 11, figs. 1, 4–7. 1897 (as *L. trapeziformis* Dryander); Kramer (1957:245, fig. 79).

Rhizome 2–3 mm diam., with brownish scales to 2 mm long, 0.2 mm wide; fronds mostly 60–100 cm long, stipe about as long as blade; stipe dark brown at base, usually stramineous upwards, abaxially usually sharply angular almost to base, sometimes obtusely angular to subterete; rachis abaxially flattened or angular; pinnae 10–20 (32) cm long, ascending (mostly 45–60° from rachis), not strongly narrowed toward apex; pinnules subtrapezoidal to falcate, 11–23 (29) mm long, 6–11 mm broad, terminal pinnule of a pinna quite or nearly free, distal pinnules not reduced more than half length of proximal pinnules; leaf tissue herbaceous; sori continuous; indusia narrow (0.2–0.3 mm broad), entire, not reaching the margin by 2–4 times indusial width.

In Tropical Rain Forest; rare in Eastern Highlands near the Guatemala border; 300 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol., Braz., Parag.); Antill., Trin. CHIAPAS COLLECTION: *34289*.

Both pinnate and bipinnate forms of this species are known (Kramer, 1957); only the bipinnate form has been found in Chiapas. According to Kramer (1957), four varieties of *L. lancea* can be recognized; only var. *lancea,* the most widespread variety, has been found in Mexico and northern Central America.

3. **Lindsaea quadrangularis** Raddi ssp. **antillensis** Kramer, Acta Bot. Neerl. 6:194. 1957.

—TYPE: Dominica, *Eggers 647* (B).

ILLUSTRATIONS: Kramer (1957:199, figs. 53–54); Proctor, Fl. L. Antill. 2:122. 1977.

Similar to *L. lancea,* but blade always bipinnate, distal pinnules of a pinna gradually shortened and much less than half as long as proximal ones, confluent with a small terminal segment; also close to *L. arcuata,* but differing in the distal part of stipe and all of rachis abaxially flattened or sulcate and the pinnules less than 3 times as long as wide.

In Montane Rain Forest; rare in Northern Highlands; 800 m. Southern Mex. (Oax.); S.A. (Ven.); P.R., L. Antill. CHIAPAS COLLECTION: *21891*.

Kramer (1957) recognized three other subspecies of *L. quadrangularis*: two of these occur in southern Brazil and Paraguay; the third, ssp. *subalata* Kramer, is more widespread, being known from Oax., Ver., Bel., Guat., Hond., Nic., C.R., Pan., Col. and Cuba. Subspecies *subalata* differs from ssp. *antillensis* in the development of pale membranous wings on the abaxial side of the secondary rachises.

Kramer (1957:195) commented that ssp. *antillensis* was the most distinct of his four subspecies and that there would be no objection to treating it as a species. In addition to the sole Chiapas collection, the only other continental North American collection of ssp. *antillensis* is *Calderon 415* (UC!), determined by Kramer in Oct. 1975. Both Mexican collections are subtripinnate.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Lindsaea divaricata Klotzsch —Guat., Pan., S.A. (Col. to Fr. Gui. and s Braz., Peru, Bol.), Guad. Differs from other Chiapas species by the combination of dark (castaneous to black), abaxially terete stipe; pale membranous wings on adaxial side of stipe and rachis, with wings on both sides of secondary rachises; pinnules ca. 2.5 times as long as wide, distal ones reduced; indusia entire or subentire.

Lindsaea portoricensis Desv. —Oax., Bel., Guat., S.A. (Col. to Fr. Gui. and s Braz.), Gr. Antill., Trin. Differs from other Chiapas species by the combination of brownish red, abaxially terete stipe; pinnae strongly ascending, often almost vertical, touching each other and the terminal pinna; pinnules subrectangular, ca. 1.5–2 times as long as wide; veins often visible as wrinkles in the leaf tissue; distal pinnules gradually reduced; indusia mostly repand-erose.

Lindsaea quadrangularis Raddi ssp. *subalata* —see discussion under *L. quadrangularis* ssp. *antillensis*.

Lindsaea stricta (Swartz) Dryander —s Mex. (Jal., Oax., Ver.), Bel., Guat., Hond., Nic., C.R., Pan., S.A. (Col. and Ven. to s Braz., Peru), Antill. Differs from other Chiapas species by the combination of abaxially terete stipe; pinnae often strongly ascending; pinnules close, roundish to subtrapeziform, to 1.5 times longer than wide; veins immersed, mostly obscure; leaf tissue rather thick, subcoriaceous; distal pinnules gradually and strongly reduced; indusia mostly strongly erose to lacerate.

53. LLAVEA

Llavea Lagasca, Gen. et Sp. Pl. 33. 1816. —TYPE: *Llavea cordifolia* Lagasca.

Plants terrestrial or on cliffs; rhizome stout, ± short-creeping, dictyostelic, scaly at apex; fronds bipinnate to tripinnate, glabrous, distal part of frond fertile with contracted segments, proximal part sterile; veins of sterile segments free, several times forked; sporangia all along the 1-forked veins (gymnogrammoid) but confluent at maturity and thus appearing to cover surface of segments (acrostichoid), partly protected by the reflexed margin; paraphyses absent; spores tetrahedral; $x = 29$.

Monotypic, with the sole species distributed from central Mexico to Guatemala. Its affinities are uncertain; Copeland (1947) regarded it as a derivative of *Pellaea,* which seems the most likely relationship.

1. **Llavea cordifolia** Lagasca, Gen. et Sp. Pl. 33. 1816.

—TYPE: "Nova Hispania," collector not stated (MA or FI?).

ILLUSTRATIONS: **Fig. 47**; Hooker, Gen. Fil. pl. 36. 1839 (as *Ceratodactylis osmundoides* J. Smith); Fée, Gen. Fil. pl. 15C. 1852 [as *Botryogramme karwinskii* (Kunze) Fée]; Rovirosa, Pterid. Sur Mex. pl. 13. 1909.

Caudex ca. 2.0–2.5 cm diam., with stramineous, lanceolate, apical scales ca. 1 cm long, 1 mm broad, these becoming blackish back from tip and with age; fronds (25) 45–110 cm long; stipe stramineous with yellowish, lanceolate, entire scales to 2.5 cm long at base; ultimate segments stalked, the sterile ovate, to 9 cm long, mostly 0.8–3 cm broad, entire or serrulate, the fertile contracted, linear, mostly 3–7 cm long, 1.5–3.0 mm broad, with strongly inrolled margin; leaf tissue subcoriaceous, especially the fertile segments, the sterile often somewhat glaucous below; n = 29 (N.L., Hgo.), 30 (Mex.).

Terrestrial or on limestone rocks, often exposed slopes, in Pine-Oak and Pine-Oak-Liquidambar forests, rarely Evergreen Cloud Forest; relatively common in Central Plateau, uncommon in Sierra Madre and Northern Highlands; 1250–1700 m. Central and s Mex. (N.L., S.L.P., Hgo., Méx., Ver., Oax., Pue.), Guat. CHIAPAS COLLECTIONS: *L&S 9908* (UC, US); *A 1311A* (UC); *A 1330* (DS, UC); *RMK 3083* (DS, UC, US); *R 200* (PH); *G 235* (PH); *GM 81* (DS, US); *La 95* (DS); *La 1068* (DS, US); *EM 4642* (MEXU, US); *H&S 20188* (US); *MC 1633* (US); *7286*; *8291*; *12658*; *13468*; *21204*; *22339*; *22406*; *28696*; *29250*; *31426*; *32309*; *34658*.

54. LOMARIOPSIS

Lomariopsis Fée, Mém. Fam. Foug. 2:10, 66. 1845. —LECTOTYPE (chosen by Holttum, Gard. Bull. Straits Settlem. (3)5:264. 1932): *Lomariopsis cochinchinensis* Fée.

Plants hemiepiphytic; rhizome dorsiventral, long-creeping, high-climbing, scaly, especially at apex, with few large vascular bundles; fronds dimorphic, fertile blade greatly contracted, with pinnae much narrower than on sterile blade; stipe base not swollen nor constricted, with numerous vascular bundles; blade pinnate, lateral pinnae ± entire, jointed to rachis, conform terminal pinna continuous with rachis; juvenile fronds with pinnae toothed, rachis more broadly alate; veins free, simple to forking; sporangia covering underside of fertile pinnae (acrostichoid), exindusiate; spores bilateral, monolete, with a broadly winged or folded perispore; x = 41, 39, 31, 16.

Pantropical, with about 18 species in the Neotropics (s Mex. to Bol. and SE Braz., Antill.) (Holttum, 1940) and about 20 species from Africa to Malesia and the Society Islands. According to Holttum, *Lomariopsis* is most closely related to *Teratophyllum* and *Lomagramma,* primarily Old World genera.

The American species seem to be plants of wet, lower-elevation rain forests, beginning their life on the ground and eventually climbing up the trunks of trees, where the production of fertile fronds seems to be triggered by greater light intensity encountered higher up in the forest. Juvenile fronds of most American species are very similar (and not usually identifiable), with coarsely dentate pinnae and broadly winged rachis.

REFERENCES: HOLTTUM, R. E. 1940. New species of *Lomariopsis*. Kew Bull. 1939:613–628; UNDERWOOD, L. M. 1906. American ferns—VII. A. The American species of *Stenochlaena*. Bull. Torrey Bot. Club 33:591–603.

a. Sterile pinnae cuneate at base, broadest in the middle, 10–15 cm long; rachis not or obscurely alate; lowermost pinnae not reduced .... 3. *L. recurvata*
aa. Sterile pinnae broadly cuneate to rounded to truncate at the base, broadest at or near their base, less than 10 cm long; rachis slightly to broadly alate; lowermost pinnae greatly to not at all reduced.
    b. Lowermost several pairs of pinnae greatly reduced (to ca. 1–2 cm long); pinnae truncate at their base ... 1. *L. fendleri*
    bb. Lowermost pinnae slightly to not at all reduced; pinnae rounded to broadly cuneate at their base ..... 2. *L. mexicana*

1. **Lomariopsis fendleri** D. C. Eaton, Mem. Amer. Acad. Arts (2)8:195. 1860.

—*Stenochlaena fendleri* (D. C. Eaton) Underw., Bull. Torrey Bot. Club 33:595. 1906. —TYPE: Venezuela, *Fendler 335* (YU; isotype K, photo P!).

Lomariopsis vestita Fourn., Bull. Soc. Bot. France 19:250. 1872. —*Stenochlaena vestita* (Fourn.) Underw., Bull. Torrey Bot. Club 33:600. 1906. —TYPE: Nicaragua, Chontales, *Lévy 476* (P—4 sheets!; isotype K! photo P!).

ILLUSTRATION: none found.

Rhizome scales stramineous to tan, usually dull, with a long, uniseriate tip; sterile fronds mostly less than 60 cm long, with very short stipe mostly less than 10 cm long; sterile blade with lower several pairs of pinnae gradually reduced to one-third or less length of longest pinnae; rachis conspicuously alate; sterile pinnae to ca. 35 pairs, mostly 4–8 cm long, 1.2–1.8 cm broad, truncate at base, abruptly acuminate and sometimes cuspidate at apex; pinna margin crenulate to serrulate; fertile fronds with pinnae 4–6 cm long, ca. 2–3 mm wide.

Hemiepiphyte, probably Lower Montane and Tropical rain forests; uncommon in s Sierra Madre; elevational data lacking. Southern Mex. (Chis. only?), Guat., Bel., Nic., C.R., Pan.; S.A. (Ven.). CHIAPAS COLLECTIONS: *P 6765*, pt. (NY); *P 6873* (NY, PH, UC, US); *P 6770* (UC, US); *Me 2035* (NY, US).

2. **Lomariopsis mexicana** Holtt., Kew Bull. 1939:617. 1940.

—TYPE: Mexico [Hidalgo], Patrero, *Hahn 56* (P!).

ILLUSTRATION: none.

Rhizome apex scales stramineous, shining, with a uniseriate tip, becoming tan with age; sterile fronds to ca. 60 cm long, with stipe 5–15 cm long; sterile blade with lowermost 1–3 pairs of pinnae somewhat reduced (to ca. two-thirds length of longest pinnae); rachis slightly alate; sterile pinnae 12–15 pairs, 6–10 cm long, 1.5–2.5 cm broad, gradually to subabruptly tapering to an acuminate to subcaudate apex, rounded to broadly cuneate at base; pinna margin subentire to crenulate; fertile fronds with pinnae to 12 cm long and 3 mm broad.

Hemiepiphyte in Tropical and Lower Montane rain forests; uncommon in Northern and Eastern highlands; 300–700 m. Southern Mex. (Hgo., Ver., Oax., Tab.?). CHIAPAS COLLECTIONS: *22473*; *33838*; *34075*.

This poorly known species is somewhat intermediate between *L. fendleri* and *L. recurvata*, and it could be a hybrid. All three Chiapas collections lack fertile fronds. The type is a rather poor specimen lacking stipe, rhizome, and lower part of blade.

3. **Lomariopsis recurvata** Fée, Mém. Fam. Foug. 2:68, pl. 28. 1845.

—*Stenochlaena recurvata* (Fée) Underw., Bull. Torrey Bot. Club 33:600. 1906. —TYPE: Mexico, Tabasco, Teapa, *Linden s.n.* (P—Herb. Delessert; isotypes P—2 sheets! photo US!).

ILLUSTRATION: **Fig. 48.**

Rhizome apex scales stramineous, shining, without a uniseriate tip, becoming tan with age; sterile fronds to ca. 1 m long, with stipe to 30 cm long; sterile blade with lowest pinnae longest or nearly so; rachis not or only obscurely alate abaxially; sterile pinnae 15–20 pairs, 10–15 cm long, 2.2–2.7 cm broad in middle, gradually tapering on both sides of middle to a cuneate base and an acuminate apex, not abruptly reduced toward blade apex; pinna margin subentire to minutely crenulate; fertile fronds shorter than sterile, to ca. 60 cm long; fertile pinnae 10–14 cm long, 2–3 mm wide.

Hemiepiphyte in Tropical and Lower Montane rain forests; uncommon in Northern Highlands (not Jitotol Ridge); 300–1000 m. Southern Mex. (Tab.), Bel., Guat., Hond. CHIAPAS COLLECTIONS: *Mi 6633* (MEXU); *21675*; *34976*; *35427*; *38210*.

Breedlove 35427 differs from typical *L. recurvata* in the very widely placed veins, 2–3 mm apart instead of 1–1.5 mm apart. It possibly represents an undescribed species, but the material is inadequate for description.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Lomariopsis japurensis (Mart.) J. Smith—Bel., Guat., Hond., Nic., C.R., Pan., S.A. (Col. to Bol. and Guy., Braz.), Trin. Distinguished from all other Chiapas species by its very wide fertile (12–16 mm) and sterile pinnae (2–4 cm).

55. LONCHITIS

Lonchitis L., Sp. Pl. 2:1078. 1753. —LECTOTYPE (first chosen by Brongniart *in* Bory de St. Vincent, Dict. Class. Hist. Nat. 9:490. 1826): *Lonchitis hirsuta* L. See Lellinger, Taxon 26:578–580. 1977.

Anisosorus Trev. ex Maxon, Sci. Surv. Porto Rico 6:429. 1926. —TYPE: *Pteris laciniata* Willd. (=*Lonchitis hirsuta* L.).

Plants terrestrial; rhizome creeping, thick and fleshy, without scales but bearing large, flattened, stout, translucent, septate hairs; stipe succulent, with 2 vascular bundles near base; blade large, deltoid, ovate, 2-pinnate-pinnatifid; lateral ridges of rachis continuous onto costae; veins free or casually areolate; leaf tissue membranaceous, with numerous septate hairs; sori 2 per segment, borne between sinus and apex of a segment, not usually extending around sinue; indusia arising from inner edge of a marginal flange, broad, membranous; spores globose-tetrahedral, trilete-scarred; $x = 50$.

Two species have been recognized by Tryon (1962), one in Africa and one in the Neotropics. The affinities of *Lonchitis* are uncertain, but probably with *Pteris* (Tryon, 1962).

REFERENCE: TRYON, R. 1962. Taxonomic fern notes. III. Contr. Gray Herb. 191:91–107.

1. **Lonchitis hirsuta** L., Sp. Pl. 2:1078. 1753.

—*Pteris hirsuta* (L.) J. Smith, J. Bot. (Hooker) 4:165. 1841 (not Poir., 1804). —*Anisosorus hirsutus* (L.) Maxon, Sci. Surv. Porto Rico 6:429. 1926. —TYPE: based on Plumier's Tract. Fil. Amer. pl. 20, 1705, illustrating a plant from Martinique (see Tryon, 1962).

Pteris laciniata Willd., L. Sp. Pl., ed. 4, 5:397. 1810. —TYPE: presumably West Indies ["*India orientalis*"], received from Flügge, collected by *Ventenat*? (B—Herb. Willd. 20013; photo GH).

Pteris gheisbeghtii J. Smith, Ferns Brit. & For. 191. 1866 (nom. nud.).

ILLUSTRATIONS: **Fig. 49**; Tryon, Contr. Gray Herb. 194:187. 1964; Proctor, Fl. L. Antill. 2:133. 1977.

Fronds (1) 2–3 m long, stipe shorter than blade, dull stramineous, hirsute; blade to 2 m long, 1 m broad; pinnae few, alternate, laxly ascending, ovate-oblong to unequally deltoid, lower ones largest, stalked, basiscopically produced; pinnules oblong, mostly 6–12 cm long, 2–3 cm broad, semiadnate, coarsely pinnatifid, or larger basal ones sessile, to 20 cm long, subpinnate, with pinnately lobed segments; segments rounded-oblong, 5–9 mm broad, subfalcate, pellucid-punctate, margin entire; $n = 100$ (Jam.).

Wet, forested ravines and stream banks, in Montane Rain Forest, Pine-Oak Forest; scattered in Eastern and Northern highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 800–1700 m. Southern Mex. (Oax., Ver.), Guat., Hond., Nic., C.R.; S.A. (Col. and Ven. to Bol.); Antill. CHIAPAS COLLECTIONS: *GM 150* (DS, US); *T&L 41618* (DS); *G 357* (K, PH); *23132*; *31618*; *32616*; *33103*; *35130*; *38937*; *42100*.

56. LOPHOSORIA

Lophosoria Presl, Gefässbündel Stipes der Farrn, 36. 1847 (preprint from Abh. Königl. Böhm. Ges. Wiss. (5)5:344. 1848). —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 251. 1875): *Lophosoria pruinata* (Swartz) Presl [≡*Polypodium pruinatum* Swartz, a nom. nov. for *Polypodium glaucum* Swartz (1788), not Thunb. (1784)] = *Lophosoria quadripinnata* (Gmel.) C. Chr.

Trichosorus Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:281. 1849. —TYPE: *Alsophila pruinata* (Swartz) Kunze [≡*Polypodium pruinatum* Swartz] = *Lophosoria quadripinnata* (Gmel.) C. Chr.

Terrestrial; rhizome ascending to erect, developing into a trunk to ca. 1 m tall, hairy at apex; fronds usually tripinnate with small, lanceolate, pinnatifid, penultimate segments; costae raised above; axes naked or hairy; veins free; leaf tissue subcoriaceous to coriaceous, often glaucous below; sori on lowest acroscopic veinlet of each segment, exindusiate, round; receptacle ± flat to only slightly raised, bearing copious hairs; sporangial pedicels with about six rows of cells; sporangial capsules asymmetrically globose, with annulus slightly oblique; spores globose-tetrahedral with an equatorial flange, large (70–100 μm at equator), 64 per sporangium; $x = 65$.

As usually construed, a monotypic genus, with the single species highly variable and described many times. *Lophosoria* is usually found in higher-elevation rain forests and cloud forests. Its affinities are obscure; Copeland (1947) thought that it might be related to *Thyrsopteris;* Tryon (1970) placed it in his Cyatheaceae in an unaffiliated position at the same evolutionary level as *Metaxya.*

REFERENCE: TRYON, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53.

1. **Lophosoria quadripinnata** (J. F. Gmel.) C. Chr., Nat. Hist. Juan Fernández 2:16. 1920.

—Polypodium glaucum Swartz, Prodr. Veg. Ind. Occ. 134. 1788 (not Thunb., 1784). *—Polypodium quadripinnatum* J. F. Gmel., Syst. Nat. 2(2):1314. "1791" [1792] (a nom. nov. for *Polypodium glaucum* Swartz). *—Polypodium pruinatum* Swartz, J. Bot. (Schrader) 1800(2):29. "1801" [1802] (a superfl. nom. nov. for *P. glaucum* Swartz). *—Alsophila pruinata* (Swartz) Kaulf. ex Kunze, Linnaea 9:99. 1834. *—Lophosoria pruinata* (Swartz) Presl, Gefässbündel Stipes der Farrn, 36. 1847. *—Alsophila quadripinnata* (J. F. Gmel.) C. Chr., Ind. Fil. 47. 1905. —TYPE: Jamaica, presumably *Swartz s.n.* (S?).

Trichosorus densus Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:284. 1849. —TYPE: Mexico, Puebla, "pr. Chinautla," *Liebmann* [Liebm. Pl. Mex. 2083, Fl. Mex. 509, 879, 880, 881, 882, 883] (C! photo US!, Morton 5592). I choose folio sheet 881 as lectotype.

Trichosorus frigidus Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:284. 1849. —TYPE: Mexico, Oaxaca, "Cerro de Sempoaltepec," *Liebmann* [Liebm. Pl. Mex. 2082, Fl. Mex. 506, 508, 884] (C! photo US!, Morton 5593). I choose folio sheet 884 as lectotype.

Trichosorus glaucescens Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:283. 1849. —SYNTYPES: all from Mexico, Dept. Oaxaca, "inter Totontepec and Trapische de la Concepcion," *Liebmann* [Liebm. Pl. Mex. 2094, Fl. Mex. 877] (C!); "inter Talea and Hac. de Sta. Gertrudes," *Liebmann* [Liebm. Pl. Mex. 2095, Fl. Mex. 875] (C! photo US!, Morton 5590). I choose folio sheet 875 as lectotype.

Trichosorus glaucescens var. *major* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:283. 1849. —TYPE: Mexico, Oaxaca, "pr. S. Jago Amatlan," *Liebmann* [Liebm. Pl. Mex. 2093, Fl. Mex. 874, 876, 878] (C! photo US!, Morton 5591).

ILLUSTRATIONS: **Fig. 50**; J. Smith, Ferns Brit. & For. 247. 1866; Fée, Crypt. Vasc. Brés. 2:pl. 104. 1873 (as *L. caesia* Presl); Stolze, Fieldiana, Bot. 39:114. 1976.

Fronds 1–3+ m long; rhizome apex and stipe bases clothed with a very dense mat of golden to brownish moniliform hairs 1–3 cm long; pinnules on larger fronds stalked 1–2 cm; costae and costules below, and often above, densely long-hairy, hairs hyaline to tan, septate, sometimes matted; $n = 65$ (Jam.).

Edges of Montane Rain Forest, Evergreen Cloud Forest, rarely Pine-Oak Forest; common in Northern Highlands (Jitotol Ridge), higher elevations of Central Plateau; s Sierra Madre; 1700–3000 m. Southern Mex. (Hgo., Méx., Ver., Pue., Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Bol., s Chile, J. Fernán.); Gr. Antill. CHIAPAS COLLECTIONS: *G 253* (PH); *P 6715* (UC, US); *L&S 9890* (UC); *MC 1585* (US); *L&S 9874* (US); *T&L 40129* (DS); *T&L 41589* (DS); *La 167* (DS); *8153*; *9059*; *9355*; *15314*; *21994*; *22055*; *22403*; *22773*; *23119*; *25303*; *31681*; *32074*; *32337*.

Remarkably variable in density and persistence of pubescence, size of fronds, and degree of glaucousness on the leaf tissue below.

The fungus *Acrospermum candidum* Setchell (Mycologia 16:242. 1924) was described as growing on this species, specifically on *Purpus 6715* (type UC!). I have not seen this fungus on any other specimen of *Lophosoria quadripinnata* from Chiapas.

57. LOXOGRAMME

Loxogramme (Blume) Presl, Tent. Pterid. 214, pl. 9, fig. 8. 1836. *—Antrophyum* Kaulf. sect. *Loxogramme* Blume, Fl. Javae Fil. 73. "1828" [1829]. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 156. 1875): *Loxogramme lanceolata* (Swartz) Presl [≡*Grammitis lanceolata* Swartz].

Epiphytes and petrophytes; roots matted, densely tomentose; rhizome creeping, scaly, scales basally attached; fronds nonarticulate or occasionally obscurely articulate, sessile or short-stipitate, simple, entire, uniform or dimorphic; veins immersed, not easily seen, forking and anastomosing freely with included veinlets; leaf tissue glabrous, thick, succulent; sori elongate, oblique to costa, in a single row on each side of costa, superficial or slightly impressed, at least some with hairlike paraphyses; spores globose-tetrahedral or bilateral, without evident perispore; $x = 35, 36$.

According to Copeland (1947), a genus of about 40 species, mostly from Polynesia and Malesia to China and Japan, but with at least one species in Africa and one in southern Mexico and Central America. The affinities of *Loxogramme* are uncertain, but it is probably a group coordinate with the polypodioid and the grammatid ferns. Copeland (1947) allied *Loxogramme* to *Grammitis.*

1. **Loxogramme mexicana** (Fée) C. Chr., Ind. Fil. Suppl. III, 125. 1934.

—*Selliguea mexicana* Fée, Mém. Fam. Foug. 7:43, pl. 10, fig. 4. 1857 (nom. nud. in Gen. Fil. 177. 1852). —*Gymnogramma mexicana* (Fée) Baker, Syn. Fil. 387. 1868. —Type: Mexico, "Sierra de San-Pedro Nolasco, Tulea, etc., *Jungersen*" [*Jürgensen*] *945* (presumably P; isotype BM!).

Grammitis salvinii Hook., Second Cent. Ferns pl. 71. "1861" [1860]. —*Loxogramme salvinii* (Hook.) Maxon, Contr. U.S. Natl. Herb. 13:17. 1909. —Type: Guatemala, Verapaz, *Salvin s.n.* (K; probable isotype BM!).

Illustrations: **Fig. 51**; also original and under synonym cited.

Rhizome long-creeping (1–5 cm between fronds), ca. 1–3 mm diam., bearing lanceolate-attenuate, strongly clathrate scales 2–4 mm long; blade sessile, oblanceolate, narrowly alate toward base, mostly 12–20 cm long, 1.0–2.5 cm broad; sori 5–12 mm long, mostly 4–6 pairs toward widest part of blade or at blade apex, slightly impressed; spores greenish, oblong, monolete, without evident perispore.

Epiphytic or on logs in Montane Rain Forest; uncommon and widely scattered in Eastern Highlands, SE Central Plateau, S Sierra Madre; 800–2100 m. Southern Mex. (Ver., Oax.), Guat., Salv., Nic., C.R., Pan. Chiapas Collections: *22844*; *25755*; *31970*; *32993*; *35201*; *38945*.

This species becomes flaccid under dry conditions but revives remarkably with moisture.

58. LOXOSCAPHE

See comments at the end of *Asplenium*.

59. LYGODIUM

Lygodium Swartz, J. Bot. (Schrader) 1800(2):106. "1801" [1802] (nom. cons.). —Type: *Ophioglossum scandens* L. [=*Lygodium flexuosum* (L.) Swartz]; see Alston and Holttum, Reinwardtia 5:12, 13. 1959.

For additional synonymy, see Lellinger, Mem. New York Bot. Gard. 18:5. 1969.

Rhizome creeping, hairy, the hairs somewhat moniliform, concolorous, stiff, blackish; stipe twining, terete, hairy at base; blades bipinnate to tripinnate, indefinitely elongate; pinnae alternate, bearing two pseudodichotomously arranged pinnules and an abortive terminal bud; veins free and forking, anastomosing in a few species; sporangia biseriate on marginal lobes of ultimate segments, each sporangium subtended by a highly modified, scalelike, antrorse outgrowth serving as an indusium; spores tetrahedral, trilete; prothallus green, flat; $x = 29, 30$.

About 9 species in the New World, many of them widely distributed; about 30 Old World species, mostly in the tropics from Africa to Japan, Pacific Basin.

References: Maxon, W. R. 1909. No. Amer. Fl. [Schizaeaceae] 16:31–52; Duek, J. J. 1978. A taxonomic revision of *Lygodium* (Filicinae) in America. Feddes Repert. 89:411–423.

a. Veins anastomosing .... 1. *L. heterodoxum*
aa. Veins free.
  b. Pinnules lobed at base, distal ones mostly shorter than the proximal .... 2. *L. venustum*
  bb. Pinnules mostly not lobed at base, all nearly equal .... 3. *L. volubile*

1. **Lygodium heterodoxum** Kunze, Farrnkr. 2:32, pl. 113. 1849.

—Syntypes: Mexico, Oaxaca, *Galeotti 6419 bis*; cultivated specimens grown at Leipzig Botanical Garden, from plants originally collected in Guatemala (LZ, destroyed).

Hydroglossum spectabile Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:299. 1849. —Type: Mexico, Oaxaca, "S. Pedro Tepinapa," *Liebmann* [Liebm. Pl. Mex. 2634; Fl. Mex. s.n., 618, 936, 937, 939, 940] (C!—the last four sheets in folio herb.). I choose no. 936 as lectotype.

Illustrations: see original; also Vareschi, Fl. Venez. 1(1):pl. 34. 1969 [venation]; Rovirosa, Pterid. Sur Mex. pl. 67. 1909; Stolze, Fieldiana, Bot. 39:37, fig. 8, c–d. 1976.

Rachis greenish stramineous to tan, ca. 2–3 mm diam., hairy to glabrescent; primary branches to 1 cm long, hairy, terminal bud usually dormant; secondary pinnae usually two, each bearing alternate, palmate (to 6-lobed) to trilobate, frequently forked segments, or distal segments simple, lobes linear-oblong, mostly 10–25 (30) cm long, 1.5–4.0 cm broad, sterile ones subentire to serrulate; costae below with a few scattered hairs to glabrescent; leaf tissue and veins glabrous on both sides; veins anastomosing to form numerous linear-hexagonal areoles; fertile segments with lobes mostly 1–5 mm long, ca. 1 mm broad.

Vine at edges of Tropical, Lower Montane, and Montane rain forests, Tropical Deciduous Forest; scattered in Northern and Eastern highlands, NE edge of Central Plateau; 300–800 (1700) m. Southern Mex. (Ver., Oax., Tab.), Guat., Hond., Nic., C.R. Chiapas Collections: *T 3820* (DS); *R 50* (US); *EM 3720* (DS, MEXU, US); *R 815* (PH); *20722*; *22241*; *22452*; *26143*; *30316*; *32795*; *33305*; *34119*; *38725*.

2. **Lygodium venustum** Swartz, J. Bot. (Schrader) 1801(2):303. 1803.

—Syntypes: Brazil and Surinam, according to Swartz (Syn. Fil. 383. 1806). —Lectotype (chosen by Proctor, Fl. L. Antill. 2:51. 1977): Brazil, *Breynius s.n.* (S?).

Lygodium mexicanum Presl, Rel. Haenk. 1:72. 1825. —Type: Mexico, collector not stated, *Haenke*? (presumably PR or PRC).

Illustrations: **Fig. 52**; Vareschi, Fl. Venez. 1(1):pl. 36. 1969; Rovirosa, Pterid. Sur Mex. pl. 66. 1909; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 3, figs. 4–5.

1897; Stolze, Fieldiana, Bot. 39:37, fig. 8, e–f. 1976; Proctor, Fl. L. Antill. 2:50. 1977.

Rachis stramineous to tan, 1.5–2.5 mm diam., hairy; primary branches to 1 cm long, densely hairy, terminal bud usually dormant; sterile secondary pinnae petiolate 1–3 cm, 15–25 cm long, 8–20 cm broad, 1–2-pinnate, rachis nearly straight, densely pubescent; tertiary segments 4–8 pairs, smaller toward apex, all but the distal stalked, deltoid-ovate from a cordate to subpalmately 3–5-lobed base, largest 3–10 cm long, 1.5–4 cm broad; costae hairy; veins free, forking, very oblique, pubescent; fertile segments with lobes 0.3–1 cm long, about 1 mm broad.

Vine at edge of Tropical and Lower Montane rain forests, Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak Forest, Savannas; common in Eastern and Northern highlands (but not Jitotol Ridge), Pacific Coastal Plain, lower elevations of Sierra Madre, canyons of Central Depression; 120–850 (1100) m. Mexico (Cma., Nay., Jal., Mich., Gro., Tam., S.L.P., Hgo., Ver., Oax.), Guat., Bel., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Bol. and Sur., Braz., Parag.); Gr. Antill., Trin. CHIAPAS COLLECTIONS: *T 3821* (DS); *GM 186* (DS, US); *W 187* (UC); *EM 16462* (MEXU, DS); *EM 3716* (MEXU, US); *Lm 3810* (PH); *20723*; *22458*; *22511*; *23807*; *25628*; *26554*; *27290*; *28654*; *32585*; *33131*; *33352*; *33921*; *36821*; *37785*; *38387*; *40069*.

I am unable to separate *L. mexicanum*, distinguished by Maxon (1909:34) in having costae of the tertiary segments not nodose-articulate (nodose-articulate in *L. venustum*), the basal costules usually alternate (rather than opposite), and lustrous leaf tissue (subopaque in *L. venustum*). Duek (1978) placed *L. mexicanum* in synonymy under *L. oligostachyum* (Willd.) Desv., with the latter given a wide distribution in Mexico, Central America, Antilles, and South America to Brazil. Historically, *L. oligostachyum*, based on a Plumier plate, has usually been considered as restricted to Hispaniola. Material from Hispaniola identified as *L. oligostachyum* in most herbaria is certainly not conspecific with any Mexican collection known to me.

The name *Lygodium polymorphum* (Cav.) H.B.K. has often been applied to the species here called *L. venustum*, but Christensen (Dansk. Bot. Ark. 9(3):3–32. 1937) believed the type to be from the Philippines and probably referable to the Asiatic species *L. flexuosum* (L.) Swartz. In any case, *L. polymorphum* is illegitimate, since Cavanilles cited *Ophioglossum scandens* L. as a synonym (see Alston and Holttum, Reinwardtia 5:15. 1959).

3. **Lygodium volubile** Swartz, J. Bot. (Schrader) 1801(2):304. 1803.

—TYPE: Jamaica, *Swartz* (S, photo US).
ILLUSTRATIONS: Vareschi, Fl. Venez. 1(1):pl. 36. 1969; Martius, Fl. Bras. 1(2):pl. 14, figs. 17–18. 1859; Stolze, Fieldiana, Bot. 39:37, fig. 8, a–b. 1976.

Differing from *L. venustum* in the ultimate pinnules all about the same size, unlobed at the base, rather long-stalked; $n = 29$ (cult.), 87–90 (Jam.).

Known in Chiapas from a single collection, without exact locality or habitat data; probably lower elevations. Elsewhere, known from Bel., Guat., Pan.; S.A. (Ven. to Gui., Braz., Arg., Peru, and Bol.); Jam., Cuba, Trin. CHIAPAS COLLECTION: *GM 98* (DS).

This is very close to, and possibly not distinct from, *L. micans* Sturm *in* Martius.

60. MARATTIA

Marattia Swartz, Prodr. Veg. Ind. Occ. 8, 128. 1788. —TYPE: *Marattia alata* Swartz.

Plants terrestrial; rhizome erect, stout, fleshy, with thin, tan scales; fronds monomorphic, usually large, with thick, fleshy stipes that bear stipules at the base; blade 2–3 (4)-pinnate; veins free, simple or forking; pinna bases darkened, somewhat inflated; costules discontinuously winged (ours), wings oblanceolate between adjacent segments; leaf tissue thick-herbaceous, usually glabrous; sporangia in 2 rows, tightly fused into a single structure (synangium) that splits over the vein to expose individual sporangia, each of which then opens by a longitudinal slit; spores bilateral (ours), monolete, hyaline; gametophytes large, green, thalloid, with a thickened midrib; $x = 40, 39$.

Copeland (1947) estimated about 60 species in the genus, distributed pantropically. Most species are in Malesia to Polynesia. The New World species are relatively few, about 10. Species of *Marattia* generally occur in middle- to higher-elevation rain forests. Their fleshy rhizomes and stipules are sometimes used as food.

REFERENCE: UNDERWOOD, L. M. 1909. Marattiaceae. *In* No. Amer. Fl. 16:15–23.

a. Blade bipinnate, pinnules 10–30 cm long .... *M. laxa*
aa. Blade tripinnate, ultimate segments 1–5 cm long.
  b. Ultimate segments not less than 1 cm long (1.0–3.5) .... 1. *M. excavata*
  bb. Ultimate segments (at least many of them) 0.5–1.0 cm long .... 2. *M. weinmanniifolia*

1. **Marattia excavata** Underw., No. Amer. Fl. 16:22. 1909.

—TYPE: Costa Rica, Coliblanco, *Maxon 272* (NY).
ILLUSTRATION: Stolze, Fieldiana, Bot. 39:18, fig. 4, a–b. 1976.

Similar to *M. weinmanniifolia* but differing in the ultimate segments mostly 2–3 cm long, 1.0–1.3 cm wide; axes less scaly below, glabrescent or with a few hairlike scales.

In Montane Rain Forest; uncommon in s Sierra Madre; 1900–2200 m. Southern Mex. (Chis. only), Guat., Salv., Hond., Nic., C.R. CHIAPAS COLLECTIONS: *P 6750* (UC, US); *Mc 7921* (MEXU); *22649*; *31624*.

The size of the ultimate segments within and among species of *Marattia* varies greatly, depending on whether the segments are from distal or proximal pinnae. Since complete fronds are rarely collected, it is difficult to assess the importance of variation in segment size. A few collections, e.g., *33694* from the Central Plateau, are rather intermediate between *M. excavata* and *M. weinmanniifolia*. Both species occur in the southern Sierra Madre, and difficulty may be encountered placing certain collections.

2. **Marattia weinmanniifolia** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:308. 1849.

—TYPE: Mexico, Oaxaca, Distr. Villa Alta, "inter Tonaguia et Roayaga," *Liebmann* [Liebm. Pl. Mex. 2187, Fl. Mex. 658, 960, 962, s.n.] (C!, nos. 960, 962, and s.n. in folio herb.; isosyntype K!); also "imellem Yalalag og Yagochi," *Liebmann* (presumably C, not found; isosyntype K!). I choose Fl. Mex. 960 as lectotype.

ILLUSTRATIONS: **Fig. 53**; Rovirosa, Pterid. Sur Mex. pl. 68. 1909 (as *M. alata*).

Fronds mostly (1.3) 2–5 m long; blade 3-pinnate; rachis sparsely scaly, olivaceous brown; ultimate segments oblong, mostly 7–14 mm long, 4–8 mm broad, dentate or crenulate at margin; pinnae to 75 cm long; costae, costules, and midveins below with tan, irregularly lanceolate or hairlike scales; pinnules alternate to subopposite; synangia 10–16 locular; $2n$ = 80 (Chis.).

In Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; relatively common in Northern Highlands (Jitotol Ridge), Central Plateau, Sierra Madre; 1500–2700 m. Southern Mex. (Hgo., Pue., Gro., Oax.), Guat. CHIAPAS COLLECTIONS: *C 325* (DS); *R&R&M 1238* (US); *GM 94* (DS); *R 1058* (PH); *G 241* (K, PH); *X&S X-463* (US); *T&L 41145*, *41638* (DS); *T 396*, *891*, *1971* (DS); *R&B 19993* (DS); *8929*; *15228*; *21993*; *22105*; *25032*; *31749*; *32187?*; *32343*; *32551*; *34442*; *34689*.

A sole collection from the vicinity of Lago Tziscao, 1300 m (*32187*), is very atypical in having small fronds (1.3 m long) and subentire to slightly toothed ultimate segments. It possibly represents an undescribed variety or even species.

Marattia weinmanniifolia differs from *M. alata* Swartz, from the Greater Antilles, in the axes being less scaly below, the receptacle naked, the ultimate segments short-elliptic to nearly round, and denticulate or serrulate rather than serrate (the teeth are somewhat curved toward segment apex in *M. alata*). Ultimate segments in *M. alata* are oblong, often more than two times longer than wide, tapering more toward the tip. Still these differences are not sharp ones, and it is possible that the two represent only a single species. The relationship between *M. weinmanniifolia* and *M. excavata* is also very close and is discussed under the latter species.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Marattia laxa Kunze—known only from Ver., Pue., and Oax. Distinguished from the other Chiapas species by the bipinnate blade with the ultimate segments (pinnules) 10–30 cm long.

61. MARSILEA

Marsilea L., Sp. Pl. 2:1099. 1753. —LECTOTYPE (first chosen by Maxon, Sci. Surv. Porto Rico 6:509. 1926): *Marsilea quadrifolia* L.

Plants subaquatic or aquatic, or on mud and subject to inundation; rhizome slender, long-creeping to sometimes compact, hairy; fronds long-stiped; blade cruciform, consisting of 4 sessile leaflets; veins freely forking, anastomosing toward their tips; sporangia in subglobose or ellipsoid structures called sporocarps, these with 2 teeth near base, splitting into 2 valves at maturity and emitting numerous sori on a gelatinous receptacle; sori including both mega- and microsporangia; megasporangia usually few, with solitary megaspores; microsporangia many, with numerous microspores; x = 20.

According to Copeland, a genus of nearly 70 species distributed on all continents, but predominantly in temperate areas. The greatest number of species occurs in Africa and Australia; relatively few species occur in wet tropical regions. Knobloch and Correll (1962) reported four species in Chihuahua; only a single species is known from Chiapas. *Marsilea* and its two allies, *Regnellidium* and *Pilularia*, are members of the isolated family Marsileaceae. The affinities of the family are uncertain.

REFERENCE: KNOBLOCH, I. W., AND D. S. CORRELL. 1962. Ferns and fern allies of Chihuahua [*Marsilea*, pp. 47–50].

1. **Marsilea mexicana** A. Br., Monatsber. Königl. Preuss. Akad. Wiss. Berlin 1870:747. 1871.

—TYPE: Mexico, "bei Julisca (Xulisca)," *Beechey s.n.* (K).

ILLUSTRATIONS: **Fig. 54**; Knobloch & Correll (1962:49).

Plants to ca. 20 cm tall or more; rhizome usually wide-creeping; stipe to ca. 18 cm long, slender; leaflets broadly cuneiform to obovate-flabellate, rounded at apex, 0.3–1.5 cm long, typically with reddish-brown stripes at maturity, glabrescent or with a few hairs near base; sporocarps ca. 4 mm long, laterally compressed, ellipsoid, covered with matted tan hairs, clustered on a peduncle from the rhizome, peduncle also bearing slender, terete, rootlike structures; sori ca. 12 per sporocarp.

Edges of pools in pastures and banks of reservoirs; uncommon in Central Plateau; ca. 2200 m. Texas, Mex. (Chih., Dgo., Aguasc., Méx.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *8316*; *37135*.

Marsilea picta Fée (Mém. Fam. Foug. 9:47. 1857), established somewhat provisionally, is probably this species; I have not seen type material (Mexico, *Schaffner s.n.*).

Both Chiapas collections seen are sterile.

62. METAXYA

Metaxya Presl, Tent. Pterid. 59. 1836. —Type: *Metaxya rostrata* (H.B.K.) Presl [≡*Aspidium rostratum* H.B.K., a new name for *Polypodium rostratum* Willd. (1810), not Burm. (1768)].

Amphidesmium J. Smith, Ferns Brit. & For. 167. 1866 (Schott, Gen. Fil. sub *Trichopteris*, 1834, nom. nud.). —Type: *Amphidesmium blechnoides* (Hook.) J. Smith [≡*Alsophila blechnoides* Hook.] ≡ *Metaxya rostrata* (H.B.K.) Presl.

Terrestrial; rhizome stout, creeping, solenostelic, hairy (scales absent); fronds large, pinnate; costae grooved; veins free, closely parallel, occasionally forked; stomates with 3 subsidiary cells, one on the side of each guard cell and a third on the side of the smaller one; sori dorsal, 1 to several per vein, round or nearly so, exindusiate; receptacle flat or nearly so; sporangia numerous, maturing together, mixed with copious hairs, pedicel short, of 4 rows of cells; annulus slightly oblique; spores apparently 64 per sporangium, ± globose with a trilete scar, with a granulate perine; x = ca. 94–96.

Monotypic, New World tropics. Its affinities are obscure, but it may be most closely related to *Lophosoria,* both genera being placed in the Cyatheaceae by Tryon (1970). Roy and Holttum (1965) suggested a relationship to *Culcita* or *Thyrsopteris.*

References: Tryon, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53; Roy, S. K., and R. E. Holttum. 1965. Cytological and morphological observations on *Metaxya rostrata* (H.B.K.) Presl. Amer. Fern J. 55:158–164.

1. **Metaxya rostrata** (H.B.K.) Presl, Tent. Pterid. 60, pl. 1, fig. 5. 1836.

—*Polypodium rostratum* Willd., L. Sp. Pl., ed. 4, 5:193. 1810 (not Burm., 1768). —*Aspidium rostratum* H.B.K., Nov. Gen. et Sp. 1:12. 1815. —*Alsophila rostrata* (H.B.K.) Mart., Icon. Pl. Crypt. Bras. 64, pl. 39. 1834. —*Amphidesmium rostratum* (H.B.K.) J. Smith, Lond. J. Bot. 1:668. 1842. —*Alsophila blechnoides* Hook., Sp. Fil. 1:35. 1844. —*Amphidesmium blechnoides* (Hook.) J. Smith, Ferns Brit. & For. 167. 1866. —Type: Venezuela, "in interioribus Americae meridionalis regionibus prope Jative," *Humboldt & Bonpland s.n.* (presumably B—Herb. Willd. 19691).

Illustrations: Roy and Holttum (1965) showing juvenile fronds; Hooker, Gen. Fil. pl. 42. 1842; Proctor, Fl. L. Antill. 2:99. 1977.

Fronds 1.5–2.0 m long, with stipe to nearly 1 cm diam.; pinnae to ca. 16 lateral pairs and a conform terminal one, lowermost stalked to ca. 10 mm, to ca. 30 cm long, 3.5 cm broad, cuneate at base, with a cartilaginous entire to repand margin and serrate apex; leaf tissue subcoriaceous, glabrous; sori mostly nearer costa than margin; n = 94–96, $2n$ = 190–192 (Sur.).

In Tropical Rain Forest; rare in Eastern Highlands near the Guatemala border; 300 m. Southern Mex. (Chis. only), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol.); L. Antill., Trin. Chiapas Collection: *34100*.

63. MICROGRAMMA

Microgramma Presl, Tent. Pterid. 213, pl. 9, fig. 7. 1836. —Type: *M. persicariifolia* (Schrader) Presl [≡*Polypodium persicariifolium* Schrader].

Plants epiphytic or occasionally terrestrial; rhizome long-creeping, dictyostelic, bearing lanceolate to acicular scales with a peltate base; stipes remote, short, articulate to short phyllopodia; blade simple, entire to occasionally undulate-margined, somewhat dimorphic, fertile blade narrower; veins anastomosing, 1–3 rows of areoles present, with some included veinlets; sori compital or terminal on veinlets, superficial, often slightly impressed, round (or elongate in a few species); indusia absent; paraphyses frequently present, usually filiform and multicellular; sporangia glabrous; spores bilateral, monolete, hyaline or yellow, minutely tuberculate; x = 37.

About 20 species in the Neotropics and 2 species in Africa; mostly low elevations. Copeland included also *Polypodium munchii* in *Microgramma,* but it seems better placed in *Pleopeltis* as a near relative of *Pleopeltis angusta.*

a. Blade glabrous on lower surface.
  b. Rhizome scales whitish; texture thick, coriaceous; rhizome mostly 3–5 mm in diam. .... 2. *M. nitida*
  bb. Rhizome scales ferruginous; texture chartaceous; rhizome mostly 2–3 mm in diam. .... 1. *M. lycopodioides*
aa. Blade with numerous scales on lower surface.
  c. Blades strongly dimorphic, the fertile linear, 2–3 (4.5) mm broad .... 4. *M. reptans*
  cc. Blades subdimorphic, the fertile elliptic, mostly 5–10 mm broad .... 3. *M. piloselloides*

1. **Microgramma lycopodioides** (L.) Copel., Gen. Fil. 185. 1947.

—*Polypodium lycopodioides* L., Sp. Pl. 2:1082. 1753. —*Pleopeltis lycopodioides* (L.) Presl, Tent. Pterid. 193. 1836. —*Phlebodium lycopodioides* (L.) J. Smith, Bot. Mag. 72. Comp. 12. 1846. —*Phymatodes lycopodioides* (L.) Millsp., Publ. Field Mus. Nat. Hist., Bot. Ser. 3:12. 1903. —Type: typification uncertain; LINN 1251.2 is this species and was apparently present in LINN in 1753 (Jackson, 1912).

Illustrations: Lowe, Ferns 2:pl. 26. 1858; Ettingshausen, Farnkr. pls. 33, 35. "1865" [1864].

Rhizome 2–3 (4) mm diam., branching freely back of apex, densely scaly, scales linear-lanceolate, long-attenuate, ca. 5–6 (10) mm long, entire or ciliate on margin, imbricate, appressed or spreading, ferruginous, becoming bicolorous with age, border and tip then lighter in color, stramineous to tan; fronds ± monomorphic or subdimorphic, the fertile slightly narrower, mostly 5–16 (20) cm long, 1–2.5 cm broad, narrowly elliptic, exstipitate, entire or sometimes undulate-margined, narrowly cuneate at base and acute at tip; leaf tissue chartaceous to subcoriaceous, glabrous on both sides; sori medial to supramedial, seemingly without paraphyses, to ca. 2 (3) mm diam.; *n* = 37 (C.R., Cuba, P.R., Jam.).

Epiphytic in Tropical, Lower Montane, and Montane rain forests; uncommon in Eastern and Northern highlands (absent from Jitotol Ridge); 300–800 m. Southern Mex. (Ver., Tab.), Bel. to Pan.; S.A. (Col. to Sur. and Bol., s Braz.); Antill. CHIAPAS COLLECTIONS: *R 1040* (PH); *S 1682* (MEXU, US); *22501*; *33040*.

2. **Microgramma nitida** (J. Smith) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:230. 1975.

—*Phlebodium nitidum* J. Smith, Bot. Mag. 72. Comp. 13. 1846 (not *Polypodium nitidum* Kaulf., 1824). —NEOTYPE (chosen here): a specimen "collect. Hort. Kew, 1851" in J. Smith's hand (BM!). This species was described from sterile cultivated material, originally from Honduras, introduced by Mrs. Col. Macdonald to Kew in 1844. I have been unable to find type material at either BM or K and so select the above specimen (fertile and possibly from the type plant or clone) as neotype.

Polypodium palmeri Maxon, Contr. U.S. Natl. Herb. 17:600. 1917. —*Phymatodes palmeri* (Maxon) Conzatti, Fl. Tax. Mex. 1(2):109. 1939. —TYPE: Mexico, Tamaulipas, near Gómez Farias, *Palmer 308* (US; isotypes K! UC!).

ILLUSTRATION: **Fig. 55.**

Rhizome funiform, 3–5 mm diam., largely unbranched but with numerous short innovations, densely scaly, scales linear-lanceolate, long-attenuate, 6–8 mm long, imbricate, appressed, central basal portion ferruginous, border and slender tip whitish and fragile, scales broken and darker with age; fronds subdimorphous, sterile ones 5–20 cm long, 2–4 cm broad, oblong or linear-oblong, nearly exstipitate, cuneate at base, apex broadly rounded to acute; fertile fronds 8–18 cm long, 0.8–2.5 cm broad, linear to linear-oblong, acute or obtuse, exstipitate, narrowly cuneate; blade rigidly chartaceous, glabrous or at first slightly fibrillose beneath along the costa; venation variable, usually evident beneath, costal areoles very small, parallel to costa, paracostal areoles large, obliquely transverse, extending more than halfway to margin, broadly oblong, usually subdivided into several diverse minor areoles; sori uniserial on each side of costa, extending usually from base to apex, nearly medial, lightly impressed, borne only in paracostal areoles, usually toward their distal end.

Epiphytic or on sandstone bluffs, in Seasonal Evergreen Forest, Tropical and Lower Montane rain forests; uncommon in Northern Highlands (absent from Jitotol Ridge), Eastern Highlands; 300–900 m. Eastern and s Mex. (Tam., S.L.P., Ver., Tab., Yuc., Camp.), Bel., Guat., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Me 2053*, *2078* (US); *Dreyer s.n.* (DS); *21934*; *21971*; *23584*; *27498*; *33169*; *33976*; *39870*.

3. **Microgramma piloselloides** (L.) Copel., Gen. Fil. 185. 1947.

—*Polypodium piloselloides* L., Sp. Pl. 2:1083. 1753. —TYPE: "Habitat in America meridionali." LINN 1251.3 is this species but, according to Jackson (1912), was added after 1755; Plumier and Petiver illustrations also cited.

ILLUSTRATIONS: Hooker, Gen. Fil. pl. 51. 1840 [as *Marginaria piloselloides* (L.) Presl]; Lowe, Ferns 1:pl. 32. 1856; Hooker, Garden Ferns pl. 18. 1862.

Similar to *M. reptans* but differing in the more broadly lanceolate rhizome scales without a long-attenuate tip; leaf tissue of sterile fronds more obviously scaly; blades subdimorphic, fertile fronds elliptic, mostly 5–10 mm broad, with sori not overlapping blade margin; *n* = 74 (Jam., P.R.).

Epiphytic on tree ferns in Pine-Oak-Liquidambar Forest; rare in N Sierra Madre; 1400 m. Antilles; N S.A. (Ven.). CHIAPAS COLLECTION: *25140*.

The Chiapas collection apparently represents the first record of this species from continental North America.

4. **Microgramma reptans** (Cav.) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:230. 1975.

—*Acrostichum reptans* Cav., Anales Hist. Nat. 1:104. 1799. —TYPE: Ecuador, Guayaquil, *Née s.n.* (MA; seen and commented upon by Christensen, Dansk Bot. Ark. 9(3):9. 1937).

Polypodium ciliatum Willd., L. Sp. Pl., ed. 4, 5:144. 1810. —*Microgramma ciliata* (Willd.) Alston, Bull. Jard. Bot. État 27:56. 1957. —TYPE: Brazil, Para, *Hoffmannsegg* (B).

ILLUSTRATION: Rovirosa, Pterid. Sur Mex. pl. 43. 1909 [as *Polypodium piloselloides*].

Rhizome ca. 0.5–1 mm diam., scales mostly 2–4 mm long, linear-lanceolate with a long-attenuate apex, entire, ± appressed, loosely imbricate, ferruginous to stramineous; blades strongly dimorphic, the sterile elliptic to ovate, to ca. 6 cm long, 1 cm wide, acute to acute-rounded at tip, nearly exstipitate, cuneate at base; fertile fronds linear, ca. 5 (9) cm long, 2–3 (4.5) mm wide; leaf tissue with scattered, ferruginous, peltate scales above and below, scales with a pale, fringed margin and a tail often longer than body of scale; mature sori usually projecting beyond margin of blade; paraphyses tan, acicular, numerous.

Epiphytic in Tropical Rain Forest, Pine-Oak-Liquidambar Forest; rare in Northern Highlands (not Jitotol Ridge), Eastern Highlands; 300–1400 m. Southern Mex. (Chis. only), Bel., Guat., Hond., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., N Braz.); Cuba, Tob. CHIAPAS COLLECTIONS: *R 859* (PH); *34129*.

64. MILDELLA

Mildella Trev., Rendiconti Ist. Lombardo, Milano (2)9:810. 1876. —TYPE: *Mildella intramarginalis* (Kaulf. ex Link) Trev. [≡*Pteris intramarginalis* Kaulf. ex Link].

Plants terrestrial or epipetric; fronds clustered near tips of short-ascending to long-creeping branches of a multicipital rhizome; rhizome scales linear-lanceolate, strongly bicolorous (young stages only weakly bicolorous and attenuate with a fragile tip, terminated by a globose, oblong cell) to concolorous; stipe and rachis stramineous to nearly atropurpureous or black, adaxially grooved or flattened, smooth, rather lustrous, always with many one- to few-celled, amber to brown, short, stiff or lax, cylindrical to slightly clavate hairs on adaxial face; blade pinnate-pinnatifid to bipinnate; basal pinnae opposite, inequilateral, basiscopically developed with broadly adnate, triangular, oblong, or linear, subcoriaceous segments; inferior basal segment of basal pinna pair entire or more or less deeply pinnatifid; distal pinnae gradually simpler and diminished, less strongly inequilateral, simple or pinnatifid, usually ascending, broadly adnate and decurrent on rachis, and (especially those near frond apex) often adnate to one another; veins free, dichotomous, 0–1-forked, their tips often reaching nearly to margin of segments and there flaring to accommodate usually a pair of short-stalked sporangia; indusia thin, inframarginal, entire, erose, or ciliate; spores tetrahedral, minutely roughened, yellowish pale brown to gray to dark brown; $x = 29$ (*M. nitidula*, $n = 58$).

A genus of eight species, two in the New World (cen. Mex. to N Pan. and Haiti) and six in the Old World (India, Pakistan, Nepal, Tibet, China, and Taiwan). *Mildella* is closely related to *Cheilanthes* and may be derived from it. All of the species are found in moderately high mountainous regions, especially along rocky embankments.

REFERENCE: HALL, C. C., AND D. B. LELLINGER. 1967. A revision of the fern genus *Mildella*. Amer. Fern J. 57:113–134.

1. **Mildella intramarginalis** (Kaulf. ex Link) Trev., Rendiconti Ist. Lombardo, Milano (2)9:810. 1876.

—*Pteris intramarginalis* Kaulf. ex Link, Hort. Reg. Bot. Berol., ed. 2, 2:34. 1833. —*Cheilanthes intramarginalis* (Kaulf. ex Link) Hook., Sp. Fil. 2:112. 1852. —*Pellaea intramarginalis* (Kaulf. ex Link) J. Smith, Cat. Kew Ferns 4. 1856. —LECTOTYPE (chosen by Hall & Lellinger, 1967:119): a cultivated specimen labeled "*Pteris intramarginalis* Klf . . . . Hort. Berol." (B).

ILLUSTRATIONS: **Fig. 56**; Hooker, Second Cent. Ferns pl. 72. 1861 [var. *serratifolia*]; Kunze, Anal. Pterid. pl. 17, fig. 1. 1837.

Rhizome becoming long-creeping with age, to 8 cm long, 5 mm diam., scaly, scales sharply bicolorous; stipe and rachis castaneous to dark brown, sometimes appearing atropurpureous, the bicellular, short, stiff hairs confined to adaxial face; fronds (8) 11–35 (41) cm long, stipe (0.8) 1–2 (2.8) times longer than rachis; blade long-lanceolate to ovate-triangular, (3.5) 7–19 (24) cm long, usually 1.3–3 times longer than wide; pinnae (1) 2–5 (6) pairs, with adnate segments (1) 2–8 (9) pairs; lower, sessile pinnae inequilaterally triangular, pinnatifid or pinnate, strongly basiscopic, the segments adnate; upper, adnate segments simple, linear to triangular, often ascending, regularly diminishing to a pinnatifid apex, terminal segments (3) 8–21 (32) mm long; spores gray to brown.

Hall and Lellinger (1967) recognized two varieties, both of which occur in Chiapas. They can be distinguished by the following key:

Segment margins entire, crenulate, or occasionally subserrate, never sharply and simply serrate; indusia entire or rarely erose; rhizome scales bicolorous with broad margins and usually the central 0.33–0.75 dark and sclerotic . . . . 1a. var. *intramarginalis*
Segment margins serrate or subserrate, occasionally merely crenulate (particularly in young fronds); indusia irregularly ciliate; rhizome scales bicolorous with narrow pale brown margins and usually the central 0.75–0.90 dark and sclerotic . . . 1b. var. *serratifolia*

1a. **Mildella intramarginalis** var. **intramarginalis.**

Rocky slopes and ravines adjacent to Montane Rain Forest, Pine-Oak-Liquidambar Forest; scattered in Northern Highlands (Jitotol Ridge), Sierra Madre; (1100) 1350–2200 m. Central and s Mex. (Tam., Qro., Hgo., Ver., Pue., Mlos., Mich., Gro., Oax.), Guat., Salv., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *R 856* (PH); *G 440* (K, US, not seen); *EM 2991* (MEXU, UC, US); *P 7244* (UC, US); *Li 1531* (BR); *22684*; *23257*; *24019*; *31639*; *31962*; *32376*; *32469*; *40651*; *41622*.

1b. **Mildella intramarginalis** var. **serratifolia** (Hook. & Bak.) Hall & Lellinger, Amer. Fern J. 57:124. 1967.

—*Pellaea intramarginalis* var. β *serratifolia* Hook. & Bak., Syn. Fil. 149. 1867. —LECTOTYPE (chosen by Hall & Lellinger, 1967:124): Mexico, Oaxaca, *Galeotti 6467* (BR).

Pteris fallax Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):53, pl. 14, fig. 2. 1842. —TYPE: Mexico, Oaxaca, "près de Tanetze, Talea et Llano-Verde," *Galeotti 6467* (BR, photo BM!).

Steep rocky slopes with *Quercus* and *Drimys*; uncommon in Central Plateau; 2100–2700 m. Central and s Mex. (N.L., Tam., Hgo., Jal., Ver., Pue., Tlax., Méx., D.F., Mlos., Mich., Gro., Oax.), Guat. CHIAPAS COLLECTIONS: *L&S 9868* (US); *G 239* (PH); *GM 65* (DS); *32077*. *Purpus 1581*, collected at Salto de Agua, was listed by Hall and Lellinger (1967) as from Chiapas, but this locality is actually in Edo. México (Sousa, Univ. Calif. Publ. Bot. 51:20. 1969).

In Chiapas, the two varieties of *M. intramarginalis* have not been found growing together or even in the same physiographic region. This reinforces their distinctness, as delimited by Hall and Lellinger (1967).

65. NEPHELEA

Nephelea Tryon, Contr. Gray Herb. 200:37. 1970. —TYPE: *Nephelea polystichoides* (Christ) Tryon [≡*Cyathea polystichoides* Christ].

Stem erect, to 15 m tall, 45 cm diam. including sheath of adventitious roots, bearing scales, especially toward apex, and blackish spines 5–26 mm long; unexpanded croziers lacking trichomes, densely squamose, with blackish spines 5–17 mm long, many of them caducous with expansion of crozier; stipe with blackish conical spines 4–15 mm long; stipe scales patent, fully adnate or slightly narrowed at base, structurally marginate, with a narrow to broad margin of cells different in orientation, size, shape, and usually color from those of central portion, bearing a dark apical seta 0.25–2.0 mm long and, occasionally, additional smaller marginal setae; minute indument of stipe, when present, of trichomidia and/or squamulae; blade 1.7–3.5 m long, 0.7–2.0 m wide; veins free, simple or forked at or near costule, basal vein on each side extending above base of sinus; sori at or near costule; indusia lacking or present and hemitelioid to sphaeropteroid; sporangia numerous, borne on a nearly globose to columnar receptacle, each containing 16 spores and with an oblique uninterrupted annulus; spores tetrahedral-globose, brown at maturity, with a striate perine; $x = 69$.

Nephelea is restricted to the Neotropics, from the Greater and Lesser Antilles and southern Mexico south to northern Argentina and southeastern Brazil. Gastony (1973) recognized 18 species in the genus, only 1 from Mexico. Most species occur in the Antilles (10) and from Costa Rica to Bolivia (7). *Nephelea* is most closely related to *Alsophila* (Gastony, 1973).

REFERENCES: GASTONY, G. J. 1973. A revision of the fern genus *Nephelea*. Contr. Gray Herb. 203:81–148; TRYON, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53.

1. **Nephelea mexicana** (Schlecht. & Cham.) Tryon, Contr. Gray Herb. 200:40. 1970.

—*Cyathea mexicana* Schlecht. & Cham., Linnaea 5:616. 1830. —TYPE: Mexico [Veracruz], Jalapa, *Schiede s.n.* (B; isotypes BM, K).

Cyathea articulata Fée, Mém. Fam. Foug. 8:111. 1857. —TYPE: Mexico [Oaxaca], "Villa-Alta et Talea," *Galeotti 6531* (isotypes B, NY).

Cyathea trejoi Christ, Bull. Herb. Boissier (2)5:733. 1905. —TYPE: Mexico, Chiapas, San Pablo, 1500 m, 1903, *Münch s.n.* (P? not found; fragm. NY).

ILLUSTRATIONS: **Fig. 57**; Gastony (1973:140, figs. 91–94); Rovirosa, Pterid. Sur Mex. pl. 2. 1909 [as *Cyathea arborea*]; Stolze, Fieldiana, Bot. 39:117, fig. 23, a–d. 1976.

Stem to 10.5 m tall and 30 cm diam., bearing black spines to 12 mm long; stipe to 1.2 m long, brown to grayish brown with black spines to 10 mm long, scales on abaxial surface sparingly persistent, brown to tan with a darkened central stripe, with a dark apical seta to 1.5 mm long and often with smaller additional marginal setae; blade to ca. 3.2 m long, 1.4 m wide, bipinnate-pinnatifid, ultimate segments falcate to subfalcate, entire to serrate-crenate; tertiary axes not alate between tertiary segments, pinna-rachis greenish-alate between the more distal sessile pinnules; costae and costules abaxially with flattish scales (not bullate) to ca. 2 mm long, tan, with several dark apical and lateral setae; veins abaxially lacking indument or occasionally with an obscure more or less araneose squamule; indusia sphaeropteroid or nearly so, often rupturing at maturity or upon drying into segments, which may be fugacious, leaving only a remnant at receptacle base; $n = 69$ (C.R.).

Open forests or edges of forests, ravines, along streams, and roadbanks, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; common in Northern and Eastern highlands, Central Plateau, Sierra Madre; 800–2200 m. Southern Mex. (S.L.P., Hgo., Méx., Pue., Ver., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Ecu.). CHIAPAS COLLECTIONS: *R 843* (K, PH); *P 6766* (UC, US); *X&S X-429* (US); *GM 76*, pt. (DS); *20300*; *22669*; *23104*; *23321*; *31667*; *32194*; *32373*; *32479*; *33004*; *34412*; *38014*.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Nephelea tryoniana Gastony —reported by Gastony (1973) from Guat., Hond., and Nic. It can be distinguished from *N. mexicana* by the complete absence of an indusium and by the presence of bullate scales on the costae and costules abaxially.

66. NEPHROLEPIS

Nephrolepis Schott, Gen. Fil. no. 3. 1834. —LECTOTYPE: uncertain, regarded by J. Smith (Hist. Fil. 226. 1875) and Tryon (Contr. Gray Herb. 194:225. 1964) as *Nephrolepis exaltata* (L.) Schott, but by Christensen (Ind. Fil. xxvii. 1906) as *Nephrolepis biserrata* (Swartz) Schott.

Plants terrestrial or epiphytic; rhizome scaly, usually stoloniferous, with stolons bearing underground tubers in several species; fronds polystichous, often in a tight cluster, nonarticulate, 1-pinnate, slowly determinate to seemingly indeterminate; pinnae numerous, articulate to rachis, often with lime-dotted hydathodes on vein tips above; veins free, 1–4-forked; sori terminal on veins, superficial or submarginal, uniserial; indusia round to semicircular or reniform; spores bilateral with a winged perispore; $x = 41$.

Perhaps 25 species, distributed in the tropics and subtropics around the world. About seven species are known in the New World, all of them widely distributed. Mutants of several species have been selected and introduced into the horticultural trade. Cultivars of two species have escaped or are likely to escape in Chiapas and so are discussed in the treatment that follows. Morton (1958) treated the more commonly cultivated species.

REFERENCES: PICHI SERMOLLI, R. 1968. Taxonomical notes on *Nephrolepis cordifolia* (L.) Presl and related species. Estratto Dagli Annali Museo Civico di Storia Naturale di Genova 77:270–277; MORTON, C. V. 1968. Observations on cultivated ferns. V. The species forms of *Nephrolepis*. Amer. Fern J. 48:18–27.

a. Indusia orbicular to orbicular-reniform, at least toward pinna base, sporangia spreading out in all directions, sinus narrow to U-shaped; vascular bundles above stipe base 3–7; leaf tissue glabrous or hirtellous or fibrillose-scaly beneath.

b. Blade glabrous beneath (ours); indusia reddish; pinnae, basal ones excepted, with base very unequal, cuneate on inferior side, acutely to subacutely auriculate on superior side .... 7. *N. rivularis*

bb. Blade commonly hirtellous or fibrillose-scaly beneath (or both); indusia tan or with a darkened center; pinnae with base rather equally cuneate to equally auriculate, or somewhat unequal and rounded on inferior side.

  c. Blade hirtellous beneath, without scales; pinna margin serrulate to crenate to bicrenate .... 1. *N. biserrata*

  cc. Blade fibrillose-scaly beneath; pinna margin crenate to subentire.

    d. Blade usually more than 8 cm broad; pinnae lanceolate, acute at tip .... 3. *N. hirsutula*

    dd. Blade usually less than 8 cm broad; pinnae oblong, rounded to subacute at tip .... 2. *N. exaltata*

aa. Indusia reniform to lunate, mostly facing pinna apex, mature sporangia projecting on open side, sinus broad or absent; vascular bundles above stipe base 1–3; leaf tissue glabrous beneath.

  e. Pinna margin entire or shallowly crenate; plants often epiphytic, fronds pendent; stipe and rachis brown, more or less glossy; scales at pinna bases few, deciduous, usually not seen .... 6. *N. pendula*

  ee. Pinna margin shallowly crenate, especially toward tip; plants usually terrestrial; stipe and rachis stramineous to light brown; scales at pinna bases usually many, more or less persistent.

    f. Pinnae acute at tip, tapering gradually from base; lower pinnae at right angles to rachis or only slightly deflexed; rhizome producing short stolons with scaly, reproductive "tubers" at tips; pinnae fewer than 25 pairs; fronds erect .... 4. *N. occidentalis*

    ff. Pinnae with a more or less rounded tip, parallel-sided to within a short distance of apex; lower pinnae somewhat deflexed at base; rhizome strongly stoloniferous, but without tubers, stolons long and thick, often forming a wiry erect caudex; pinnae up to 50 pairs per frond; fronds arching .... 5. *N. pectinata*

1. **Nephrolepis biserrata** (Swartz) Schott, Gen. Fil. pl. 3. 1834.

—*Aspidium biserratum* Swartz, J. Bot. (Schrader) 1800(2):32. "1801" [1802]. —Type: Mauritius, *Gröndal* (S—Herb. Swartz).

Aspidium acutum Schkuhr, Kr. Gew. 1:32, pl. 31. 1809? —*Nephrolepis acuta* (Schkuhr) Presl, Tent. Pterid. 79. 1836. —Type: uncertain, original publication not seen.

Nephrolepis mollis Rosenst., Repert. Spec. Nov. Regni Veg. 22:13. 1925. —Type: Costa Rica, *Brade 141* [Rosenst. exsicc. 289] (S? isotype UC!).

Illustrations: Vareschi, Fl. Venez. 1(1):pl. 57, figs. 1–3. 1969; Tryon, Contr. Gray Herb. 194:228. 1964; Small, Ferns SE States 307. 1938; Proctor, Fl. L. Antill. 2:227. 1977.

Plants perennial; rhizome suberect to erect, stout, bearing reddish-tan to castaneous, lanceolate, shining scales; stolons lacking tubers; stipe (2) 3–6 mm diam., tan to brown, filiform-scaly to glabrescent, with 5–7 vascular bundles above base; fronds erect to arching, mostly (0.25) 1–2.5 m long; rachis stramineous to tan, filiform-scaly to hairy to glabrescent; pinnae short-stalked, ± equally cuneate to equally auriculate at base, mostly (3) 6–20 cm long, (0.6) 1–2 (2.5) cm broad, apex of longer pinnae with acuminate apex, margin finely serrulate (sterile blades) to crenate or bicrenate (fertile blades); leaf tissue finely hirtellous beneath (ours), the hairs septate, sometimes also with a few fibrillose stramineous to tan scales on costae below; indusia thin, tan, hirtellous, collapsing when sori mature, rotund-reniform, mostly facing pinna margin, the sinus narrow, mature sporangia projecting on all sides; n = 41 (P.R., Jam., Afr., India).

On rocks (terrestrial to epiphytic elsewhere in the range) in Tropical Rain Forest; rare in Eastern Highlands; 350 m. Southern Mex. (Nay., Oax., Ver., Tab.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Sur. and Peru, Braz.); Fla., Antill., Trin.; Paleotropics. Chiapas Collection: *33220*.

According to Proctor (Rhodora 63:32. 1961), the plant known as *N. biserrata* cv. *furcans* in the horticultural trade should be called *N. falcata* (Cav.) C. Chr. forma *furcans* (Moore *in* Nicholson) Proctor. A single cultivated gathering has been seen from Chiapas: *EM 18762* (MEXU, US). *Nephrolepis falcata* is native to the Old World, and the forma *furcans* apparently originated in Australia and was subsequently cultivated in England and now the New World (Proctor, loc. cit.).

2. **Nephrolepis exaltata** (L.) Schott, Gen. Fil. pl. 3. 1834.

—*Polypodium exaltatum* L., Syst. Nat., ed. 10, 2:1326. 1759. —Type: "Sloan jam. t. 31" [representing a plant collected by Harlow on Jamaica; see Jenman, J. Bot. 24:34, 1886].

Illustrations: Small, Ferns SE States 303. 1938; Tryon, Contr. Gray Herb. 194:228, fig. 177. 1964.

Plants perennial; rhizome suberect, bearing linear-lanceolate to filiform ferruginous or castaneous scales at apex; stolons lacking tubers; fronds erect to usually arching, mostly 0.6–1.5 (2.5) m long, stipe short, pale brown, deciduously fibrillose-scaly, with 3 (rarely 5) vascular bundles at base; blade linear, mostly 0.4–0.8 (2.0) m long, narrowed at base, rachis stout, stramineous to pale brown, deciduously fibrillose-scaly; pinnae subsessile to short-stalked, contiguous or subimbricate at base, mostly subfalcate, 4–8 (10) cm long, 8–15 mm broad at the middle, usually rather unequal at the base, inferior side rounded to auriculate, superior side auriculate, apex obtuse to acute, margins subentire to crenulate; leaf tissue fibrillose-scaly to glabrate beneath; indusia orbicular to orbicular-reniform toward pinna base to usually reniform or lunate toward apex; n = 41 (Jam.), $2n$ = 82 (India).

From Chiapas, known only from cultivated specimens, but perhaps escaping; gardens in San Cristóbal Las Casas, Ocozocoautla, Chiapa de Corzo, and no doubt elsewhere. Native range uncertain, but probably s Mex. (Ver., Oax.); S.A. (s Braz.); certainly Fla., Gr. Antill., Ber.; widely dispersed in Old World tropics but presumably introduced there. Chiapas Collections: *16064*; *23670*.

Cultivars of this species, some very finely dissected, are grown in cities of Chiapas: *16031*; *16061*; *22862*; *23496*.

3. **Nephrolepis hirsutula** (J. G. Forst.) Presl, Tent. Pterid. 79. 1836.

—*Polypodium hirsutulum* J. G. Forst., Fl. Ins. Austral. Prod. 81. 1786. —Type: not stated, presumably from the South Pacific, *Forster s.n.* (GOET?).

Illustration: Holttum, Fl. Malaya, II (Ferns) 377, fig. 222. 1954.

Closely related to *N. biserrata*, differing by the leaf tissue and costae below with numerous, appressed, stramineous to tan, filiform scales, not hirtellous; rachis with rather dense, persistent, linear-lanceolate scales; indusia relatively thick, tan or often castaneous at point of attachment, glabrous, not collapsing when sori mature, reniform to rotund-reniform. From *N. exaltata* differing by the broader blade, more lanceolate pinnae, and leaf tissue below more densely scaly; $n = 41$ (Sri Lanka); $2n = 82$ (India).

Along roadsides and river banks in Tropical and Lower Montane rain forests; uncommon in Northern and Eastern highlands; 350–450 m. Distribution uncertain, but specimens seen from Nic., Jam., L. Antill., Ven. Native to O.W. trop., especially Asia and Pacific Basin. Chiapas Collections: *26449*; *34482*.

The two Chiapas collections agree nearly perfectly with the numerous collections from the Pacific Basin. From the spotty distribution of this species in the New World, it seems likely that *N. hirsutula* has been introduced into the New World.

The name *N. multiflora* (Roxburgh) Jarrett ex Morton seems to have been incorrectly applied to some New World specimens that I regard as *N. hirsutula* (but see Morton, Contr. U.S. Natl. Herb. 38:309. 1974).

4. **Nephrolepis occidentalis** Kunze, Linnaea 18:343. 1844.

—Type: Mexico, *Leibold 27* [127?] (holotype LZ, destroyed; presumed isotype B). For a discussion of typification, see Pichi Sermolli, Estratto Dagli Annali del Museo Civico di Storia Naturale di Genova 77:274, 1968.

Nephrolepis intermedia Fée, Mém. Fam. Foug. 9:32. 1857. —Type: Mexico [Veracruz], "Orizaba," *Schaffner 447* (isotype K!).

Illustration: Tryon, Contr. Gray Herb. 194:232. 1964.

Plants annual, with poorly developed rhizome, apparently arising from tubers, stolons relatively few; stipe tan, 3–8 cm long, with 1–3 vascular bundles above base; fronds laxly spreading, few (1–4), mostly 15–40 (70) cm long, 3–8 cm broad; rachis weak, glabrous; blade thin, usually pale green, with evident veins, glabrous or minutely glandular-pubescent; pinnae sessile, narrowly triangular, unequal at base, rounded to subauriculate on inferior side, auriculate with auricle slightly overlapping rachis on superior side, acute at apex; indusia tan, reniform to lunate, mostly facing apex of pinna; $n =$ ca. 45 (Nay.).

Shaded rocky banks, Pine-Oak slopes, Montane Rain Forest; uncommon in Central Plateau, Sierra Madre; 900–1350 m. Southern Mex. (Jal., Nay., Méx., Mlos., Gro., Oax.), Salv., Nic., C.R.; S.A. (Col., Ven., Peru, Braz.); Gr. Antill. Chiapas Collections: *GM 25* (DS, US); *GM s.n.* (DS); *A 1345* (DS, NY, UC); *P 6866* (UC, US); *G 309* (K, YU); *28698* (dissected form); *38604*; *40113*.

5. **Nephrolepis pectinata** (Willd.) Schott, Gen. Fil. pl. 3. 1834.

—*Aspidium pectinatum* Willd., L. Sp. Pl., ed. 4, 5:223. 1810. —Type: locality and collector not stated (B—Herb. Willd. 19753; photo GH).

Illustration: Tryon, Contr. Gray Herb. 194:232. 1964.

Rhizome with a perennial erect caudex, abundantly stoloniferous but without underground tubers; fronds stiffly erect, in a tight bundle, ca. 30–45 cm long, 2.5–4 cm broad; stipe tan, glabrescent, with 1 vascular bundle above base; pinnae sessile or subsessile, very unequal at base, cuneate to base of costa on inferior margin, auriculate on superior side, not overlapping or concealing rachis on inner side, apex obtuse to acute; leaf tissue glabrous to glabrescent below; indusia reniform to semiorbicular, mostly facing pinna apex; $n = 41$ (Chis.), 82 (Jam.).

In large colonies on the forest floor, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; locally common in Northern and Eastern highlands, Central Plateau, n Sierra Madre; 800–1600 m. Southern Mex. (Oax., Ver., Pue.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Peru); Jam., Cuba. Chiapas Collections: *GM 153* (DS); *MC 1825* (US); *Dr 1642* (NY, US); *10364*; *21052*; *21804*; *22357*; *24881*; *25123*; *31427*; *31498*; *32129*; *32454*; *32908*; *34563*.

This is the most common species of *Nephrolepis* in Chiapas, covering the forest floor in certain areas, especially in the Northern Highlands. Specimens from southern Mexico differ from those from the Antilles and from Costa Rica and further south in being more robust. Monographic study is badly needed.

6. **Nephrolepis pendula** (Raddi) J. Smith, J. Bot. (Hooker) 4:197. 1841.

—*Aspidium pendulum* Raddi, Opusc. Sci. 3:289. 1819. —Type: Brazil, *Raddi* (FI; isotype K!).

Illustrations: **Fig. 58**; Raddi, Pl. Bras. 1:pl. 45. 1825.

Plants perennial; rhizome short-creeping to suberect, clothed with numerous atrocastaneous to atropurpureous (sometimes nearly black) scales, these often laxly whitish-ciliate on margin; stolons lacking tubers (always?); stipe stiff, 1–2 mm diam., brownish, often polished, glabrous or glabrescent but with a few persistent scales at base, with 1–3 vascular bundles above base; rachis brownish, glabrous except at pinna bases; fronds pendent, 30–100 or more cm long, 3.5–7 cm broad; pinnae sessile to short-stalked, unequal at base, truncate to rounded to subcordate on inferior side, acutely to obtusely auriculate on superior side, margins mostly entire, apex usually rounded or obtuse; blade glabrous beneath, dark green to gray-green, chartaceous to subcoriaceous, veins not or scarcely visible, above with usually conspicuous lime-dotted hydathodes; indusia reniform to semicircular, mostly opening toward pinna apex; $n =$ ca. 40, $2n =$ ca. 82 (Gal.).

Epiphytic (rarely terrestrial?) in Tropical and Lower Montane rain forests, rarely Montane Rain Forest; uncommon in Eastern and Northern highlands (not Jitotol Ridge), rare in Sierra Madre; 200–550 (1500) m. Southern Mex. (Tab.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Guy. and Bol., Braz.). Chiapas Collections: *S 1663* (MEXU, US); *C&D 249* (US); *G 294* (K); *24035*; *32801*; *33140*; *33944*; *34481*; *34272*.

I disagree with Tryon (Contr. Gray Herb. 194:230. 1964), who treated this name as a synonym of *N. cordifolia* (L.) Presl. *Nephrolepis cordifolia* differs in having lighter brown, dull, often persistently fibrillose-scaly stipes and rachises, tan rhizome scales, often crenate-margined pinnae with acute apices, and presence (often) of tubers. I have not seen good specimens of *N. cordifolia* from Mexico or Central America; it seems to be uncommon in South America. My concept of *N. cordifolia* is gained from specimens collected in the West Indies, Asia, and the Pacific. The type of *N. cordifolia*, according to Pichi Sermolli (1968:271), is Plumier's plate 71 (Traité des Fougères de l'Amerique, 1705), illustrating a plant from Hispaniola. This plate is inadequate for typifying the name; this is yet another reason for not using it for Chiapas collections.

7. **Nephrolepis rivularis** (Vahl) Mett. ex Krug *in* Urban, Bot. Jahrb. Syst. 24:122. 1897.

—*Polypodium rivulare* Vahl, Eclog. Amer. 3:51. 1807. —TYPE: Montserrat, *Ryan* [*11*] (C—3 sheets!).

ILLUSTRATION: Tryon, Contr. Gray Herb. 194:228. 1964.

Plants perennial; rhizome short-creeping to suberect, clothed with laxly ciliate, atrocastaneous scales; stipe 2–3.5 mm diam., brownish, persistently scaly at base, with 3–5 vascular bundles above base; fronds (0.4) 0.6–2 m long, with blade (3) 5–12 cm broad, slightly narrowed toward base; pinnae sessile, subfalcate, very unequal at base, cuneate on basiscopic side, acutely auriculate on acroscopic side, inner margin truncate and parallel to rachis, apex usually acute to acuminate; sori supramedial; indusia orbicular, often reddish with a blackish center and a very narrow sinus, sporangia projecting on all sides when mature.

Known in Chiapas from a single collection, without habitat or elevational data; "near Petapa" (Northern Highlands?). Southern Mex. (Oax.), Guat., Nic., Pan.; S.A. (Col. to Peru and Sur., Braz.); Antill., Trin. CHIAPAS COLLECTION: *C&D 92* (US).

67. NEURODIUM

Neurodium Fée, Mém. Soc. Mus. Hist. Nat. Strasbourg 4(1):201. 1850. [as "*Nevrodium*"]. —TYPE: *Neurodium lanceolatum* (L.) Fée [≡*Pteris lanceolata* L.].

Paltonium Presl, Epim. Bot. 156. "1849" [1851]. —TYPE: *Paltonium lanceolatum* (L.) Presl [≡*Pteris lanceolata* L.]. See Pichi-Sermolli (Webbia 9:361–366. 1953) for a discussion of publication dates.

Plants epiphytic; rhizome short-creeping, dictyostelic, scaly; fronds approximate, articulate to rhizome, short-stalked, simple, entire-margined; veins immersed, not easily seen, reticulate with simple or hamate excurrent and recurrent included veinlets; leaf tissue glabrous; sporangia submarginal, coenosoral, confined to distal part of blade, which is usually somewhat contracted; paraphyses none or filamentous; spores bilateral, hyaline, minutely tuberculate; $x = 37$.

Monotypic. Perhaps related to *Pleopeltis,* differing from that genus in the submarginal coenosori and lack of scales on leaf tissue.

1. **Neurodium lanceolatum** (L.) Fée, Mém. Fam. Foug. 3:28. 1852.

—*Pteris lanceolata* L., Sp. Pl. 2:1073. 1753. —*Taenitis lanceolata* (L.) Kaulf., Enum. Fil. 130. 1824. —*Paltonium lanceolatum* (L.) Presl, Epim. Bot. 156. "1849" [1851]. —TYPE: based on Plumier, Descr. Pl. Amer. pl. 40, 1693 (=Tract. Fil. Amer. pl. 132, 1705) illustrating a plant from Hispaniola.

ILLUSTRATIONS: **Fig. 59**; Rovirosa, Pterid. Sur Mex. pl. 53. 1909; Fée, Gen. Fil. pl. 8c. 1852; Proctor, Fl. L. Antill. 2:345. 1977.

Roots densely tomentose; rhizome scales imbricate, ovate, entire, dark brown, clathrate; fronds numerous, rigidly ascending, 20–40 cm long, stipe short (1–5 cm), tan, narrowly alate upwards; blade 1.5–3 (4) cm broad at middle, long-attenuate both ways, fertile distal half or third sometimes subcaudate; costa elevated, stramineous; margin entire to repand; leaf tissue coriaceous, bright green, lustrous, without scales; sori 2–3 mm broad, extending almost to the obtuse tip; $n = 37$ (Jam.).

Epiphytic in Tropical Rain Forest; rare in Northern Highlands (6–12 km s of Palenque); 300 m. Southern Mex. (Tab.), Bel., Guat., Hond., Nic.; Fr. Gui.; Fla., Antill. CHIAPAS COLLECTIONS: *Me 2047* (US, not seen, cited by Maxon, Proc. Biol. Soc. Wash. 46:140. 1933); *29761*.

68. NIPHIDIUM

Niphidium J. Smith, Hist. Fil. 99. 1875. —TYPE: *Niphidium americanum* (Hook.) J. Smith [≡*Polypodium americanum* Hook.] = *Niphidium longifolium* (Cav.) Morton & Lellinger.

Pessopteris Underw. & Maxon, Contr. U.S. Natl. Herb. 10:485. 1908. —TYPE: *Pessopteris crassifolia* (L.) Underw. & Maxon [≡*Polypodium crassifolium* L.] ≡ *Niphidium crassifolium* (L.) Lellinger.

Rhizome short- to long-creeping, younger portions densely covered with roots bearing a fine tomentum of root hairs, dictyostelic, scaly, scales lanceolate-acuminate, concolorous to sharply bicolorous, attached near base to almost centrally; stipe tan, scaly only at base, usually 1–5 cm apart on rhizome, articulate, phyllopodia obsolete to 1 cm long; blade simple, narrowly elliptic-lanceolate to oblong, coriaceous, often glaucous, often white-dotted or with dark brown or black hydathodes above, sometimes with a few scales along midrib; main veins straight, ascending, prominulous beneath, secondary veins immersed, forming inconspicuous, irregular, transverse areoles with numerous minor areoles containing excurrent and recurrent free veinlets; sori solitary in major areoles, forming single rows of (3) 5–12 (15) sori between main veins, appearing compital but veins forming an irregular ring beneath sorus, round or slightly oblong, superficial; paraphyses (abortive sporangia) sometimes numerous, sporangia sometimes with multicellular, hyaline, linear or slightly clavate hairs on capsule; spores bilateral, monolete, hyaline, smooth; $x = 37$.

Niphidium is an exclusively Neotropical genus of 10 species, occurring from the Antilles and southern Mexico to Bolivia and northeastern Argentina. Species may be either epiphytic or terrestrial or both. Most species are Andean; a single species occurs in Mexico. Affinities of *Niphidium* are certainly with the polypodioid ferns, but the genus appears isolated and without close relatives.

REFERENCE: LELLINGER, D. B. "1972" [1973]. A revision of the fern genus *Niphidium*. Amer. Fern J. 62:101–120.

1. **Niphidium crassifolium** (L.) Lellinger, Amer. Fern J. 62:106. "1972" [1973].

—*Polypodium crassifolium* L., Sp. Pl. 2:1083. 1753. —*Pessopteris crassifolia* (L.) Underw. & Maxon, Contr. U.S. Natl. Herb. 10:485. 1908. —LECTOTYPE (chosen by Lellinger, "1972":106): Petiver's "Pterigraphia Americana" pl. 6, fig. 1, 1712, which is a redrawing of Plumier's Tract. Fil. Amer. pl. 142, 1705, illustrating a plant from Martinique.

ILLUSTRATIONS: **Fig. 59**; Rovirosa, Pterid. Sur Mex. pl. 46. 1909.

Rhizome creeping, (5) 8–12 mm diam., rarely pruinose; phyllopodia 5 mm long, 3–5 mm wide; rhizome scales lanceolate-acuminate, ca. 8–12 mm long, 2.5–4 mm wide, plane throughout, usually strongly bicolorous, central band blackish, cells usually strongly clathrate, those above base (2) 3–5 times longer than wide, margin pale tan, entire or slightly repand, sometimes erose with age; stipe 5–15 (50) cm long, 3–5 (9) mm diam., adaxially flattened or sulcate; blade usually narrowly oblanceolate, sometimes narrowly lanceolate, attenuate or acuminate at base, acute to rounded at apex, (25) 45–90 (105) cm long, (3) 6–11 (18) cm wide, dark green above in life, brown and often glaucous above when dry, with brown hydathodes, paler beneath; midrib scales to 2 mm long, 0.75 mm wide, like those of rhizome, caducous, seldom seen; principal veins (4) 5–8 (12) mm apart, closer in juvenile and partially developed fronds; sori 1.5–3.5 (5) mm diam.; sporangia with up to 10 deciduous, linear to slightly clavate, (1) 2-celled hairs on capsule; paraphyses usually common among the sporangia; $n = 74$ (Jam.).

Epiphytic or sometimes terrestrial, in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; common in Northern and Eastern highlands, Central Plateau, uncommon in Sierra Madre; 350–1700 m. Southern Mex. (Ver., Oax., Pue.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Sur. and Bol., Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *EM 2770* (MEXU, US); *R 207* (PH); *Z 501* (DS); *Boege 1124* (DS); *6361*; *8234*; *20270*; *21370*; *21605*; *22168*; *22283*; *22426*; *24033*; *24992*; *27921*; *28132*; *28910*; *29176*; *29853*; *32324*; *32487*; *32932*; *33201*; *34531*; *35158*; *36656*; *38027*; *41980*.

69. NOTHOLAENA

Notholaena R. Brown, Prodr. Fl. Nov. Holl. 145. 1810. —LECTOTYPE (chosen by Christensen, Ind. Fil. xli. 1906): *Notholaena marantae* (L.) R. Brown [=*Acrostichum marantae* L.]. But see discussion below.

Small, lithophytic ferns with compact, short-creeping to suberect, multicipital rhizome; fronds rigidly erect or sometimes spreading, uniform; stipe usually dark and rigid; blade linear to pentagonal, 1–4-pinnate and variously lobed or pinnatifid, thick-herbaceous to coriaceous, scaly, hairy, or glandular, in some species white- to yellow-ceraceous beneath, rarely without indument; veins free, simple to 2-forked, sometimes enlarged at tips; sori submarginal, borne at or near tips of veins; indusia wanting, leaf margin usually unmodified and flat, sometimes revolute and partially concealing the sporangia, sporangia often somewhat protected and hidden by hairy, scaly, or waxy vestiture; spores globose to tetrahedral, usually 32 or 64 per sporangium; gametophytes cordate, with a lateral meristem; $x = 29, 30$.

About 60 American species and a very few Old World (primarily African) species, chiefly from arid regions. The center of distribution is central and northern Mexico and southwestern United States. The difficulties of separating *Notholaena* from other cheilanthoid genera, especially *Cheilanthes*, are well known. These difficulties prompted Mickel (1979) to reunite *Cheilanthes*, *Notholaena*, and several other segregate genera (e.g., *Aspidotis*). I follow Tryon (1956) in the circumscription of *Notholaena*. However, those species that bear hairs and/or scales on the lamina but lack wax (first lead of couplet "a") seem more closely related to species currently placed in *Cheilanthes* than they are to the waxy or glabrous Notholaenas (Tryon, 1980). Since the type of *Notholaena* itself bears scales and lacks wax, Tryon (1980) proposed *N. trichomanoides* (L.) Desv., a waxy species, as conserved type.

REFERENCES: TRYON, R. 1956. A revision of the American species of *Notholaena*. Contr. Gray Herb. 179:1–106; TRYON, R. 1980. Proposal to conserve *Notholaena* with the type *Pteris trichomanoides*. Taxon 29:160; MICKEL, J. T. 1979. The fern genus *Cheilanthes* in continental United States. Phytologia 41:431–437.

a. Indument of blade, including upper and lower surfaces but excluding rachis, of scales or of hairs, or both, not ceraceous.
  b. Indument of loosely matted hairs and very narrow scales, not concealing the leaf tissue .... 4. *N. cinnamomea*
  bb. Indument of lower surface of blade dense, concealing the leaf tissue.
    c. Indument of scales, at least in part.
      d. Indument of scales only (some dissected into capillary lobes, giving the appearance of tomentum) .... 8. *N. sinuata* var. *sinuata*
      dd. Indument of both hairs and scales, hairs of blade slender, not moniliform, lanate on both surfaces .... 2. *N. brachypus*
    cc. Indument of hairs only .... 1. *N. aurea*
aa. Indument of blade, including upper and lower surfaces but excluding rachis, lacking, or wholly (or at least in part) ceraceous (wax may be completely concealed by scales).
  e. Indument of lamina ceraceous and of scales or hairs, or indument lacking.

f. Indument of blade lacking .... 5. *N. formosa*
ff. Indument of blade consisting of scales and hairs, these concealing the wax .... 6. *N. galeottii*
ee. Indument of lamina wholly ceraceous.
g. All ultimate segments adnate for their whole breadth; rhizome scales dark-sclerotic, with or without pale margins.
h. Blade commonly longer than broad, lowest pinnae not markedly larger than those immediately above nor strongly inequilateral .... *N. affinis*
hh. Blade often as broad as long, or broader, lowest pinnae much the largest, deltoid and strongly inequilateral by prolongation of basiscopic pinnule on lower side.
i. Scales of rhizome and base of stipe with entire to erose-ciliate margin, glandular, if at all, only at apex; blade in well-developed fronds ovate-pentagonal or narrower, not less than half as long as stipe .... 3. *N. candida* var. *candida*
ii. Scales of rhizome and base of stipe with erose-denticulate, deciduously glandular margin; blade broadly pentagonal, usually not more than a third as long as stipe .... *N. sulphurea*
gg. At least some ultimate segments constricted and petiolate at base, not adnate for their full breadth ... 7. *N. incana*

1. **Notholaena aurea** (Poir.) Desv., Mém. Soc. Linn. Paris 6:219. 1827.

—*Pteris aurea* Poir., Encycl. Méth. 5:710. 1804. —TYPE: Peru, *J. de Jussieu* (P—JU, sheet 1333!; photo GH).

Acrostichum bonariense Willd., L. Sp. Pl., ed. 4, 5:114. 1810. —*Notholaena bonariensis* (Willd.) C. Chr., Ind. Fil. 6. 1905; 459. 1906. —TYPE: "Bonaria" [Buenos Aires, Argentina] (B—Herb. Willd. 19537?; photo GH). The specimen in Herb. Willdenow is labelled "in valle Guadeloupe prope Mexico."

Cheilanthes ferruginea Willd. ex Link, Enum. Pl. Berol. 2:463. 1822. —*Notholaena ferruginea* (Link) Hook., Second Century Ferns, sub. pl. 52. 1861 (not Desv., 1813). —TYPE: "America meridionali" (B; photo GH).

Notholaena chiapensis Rovirosa, Pterid. Sur Mex. 229, pl. 48, figs. 1–6. 1909.—TYPE: Mexico, Chiapas, "prope El Sacramento," *Rovirosa 1077* (PH! photo MO, US; isotype GH).

ILLUSTRATIONS: Tryon (1956:33); Rovirosa, Pterid. Sur Mex. pl. 48, figs. 1–6. 1909; Knobloch & Correll, Ferns Chih. 157. 1962.

Rhizome short-creeping; scales linear-lanceolate, with shining, castaneous, sclerotic central band and narrow or relatively broad, pale brown, entire margin; fronds ca. 20–60 (70) cm long, mostly 1.5–3.0 cm broad, stipe ca. ⅓ as long as blade or less, terete, castaneous or blackish, with a single vascular bundle, clothed (as is rachis) with coarse, straightish, subappressed, whitish, septate hairs; blade linear, long-attenuate, pinnate-pinnatifid almost to the gradually narrowed obtuse apex, upper surface rather sparsely clothed with hairs similar to those of stipe, lower surface covered with dense, tawny tomentum (white when young) of fine, matted hairs; pinnae up to 40 pairs, oblong, cut ½–¾ to costa into oblong or linear-oblong, obtuse lobes; sporangia 32-spored, borne on vein tips, leaf margin modified into a very narrow subhyaline band; $2n = 90$ (Ariz.).

Uncommon, often on rather dry rocky ridges; widely scattered localities in Sierra Madre, Northern Highlands, Central Plateau; 1900–2100 m. Widely distributed in the New World, from SW U.S., throughout Mex., C.A.; S.A. (Ven. to Chile and NW Arg.); Gr. Antill. CHIAPAS COLLECTIONS: *GM 16* (DS); *R 1077* (PH); *G 275* (GH, Y, K, only the last seen); *G 304* (K); *22686*.

2. **Notholaena brachypus** (Kunze) J. Smith, Ferns Brit. & For. 172. 1866.

—*Cheilanthes squamosa* Hook. & Grev. var. *brachypus* Kunze, Linnaea 18:340. 1844. —*Cheilanthes brachypus* (Kunze) Kunze, Linnaea 23:307. 1850. —TYPE: Mexico, *Leibold 52* (B, photos GH, K; isotype K!).

ILLUSTRATION: Tryon (1956:25).

Rhizome short, thick, erect; scales linear-attenuate, brown to castaneous, capillary-tipped, entire or somewhat pectinate-serrulate; fronds 4–28 cm tall, stipe very short or wanting, with a single vascular bundle; blade narrowly elliptic, gradually narrowed below, pinnate-pinnatifid, with 10–21 pairs of pinnae, lower surface with dense, ferruginous, lanate tomentum beneath the imbricate, ovate-lanceolate, long-attenuate, entire or somewhat serrulate scales, upper surface with thin tomentum of similar hairs; rachis brown, covered with scales similar to those of blade; pinnae lanceolate, obtuse or acutish, the middle the longest, deeply cut into 5–10 pairs of oblong, obtuse lobes; sporangia 32-spored, borne on ends of dilated veins, leaf margin modified into a hyaline band somewhat incurved over sporangia.

Relatively common along rocky banks and dry ravines, Tropical Deciduous Forest, Seasonal Evergreen Forest; Pacific Coastal Plain, Sierra Madre, Central Depression where it borders Sierra Madre; 200–1100 (1900) m. Western and s Mex. (Sin., Cma., Jal., Nay., Mich., Gro., S.L.P., Ver., Mlos.), Guat., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *GM s.n.* (DS); *19852*; *22536*; *22685*; *25585*; *27306*; *28589*; *36709*; *37733*; *40623*; *41798*.

3. **Notholaena candida** (Mart. & Gal.) Hook., Sp. Fil. 5:110. 1864.

—*Cheilanthes candida* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):73, pl. 20, fig. 1b. 1842. —*Aleuritopteris candida* (Mart. & Gal.) Fée, Gen. Fil. 154. 1852. —TYPE: Mexico, Jalisco, N of Guadalajara, *Galeotti 6442* (BR!; photo BM! isotypes BR!).

ILLUSTRATIONS: **Fig. 60**; Tryon (1956:67); Knobloch & Correll, Ferns Chih. 117. 1962.

Rhizome short-creeping, branched; rhizome scales lanceolate or subulate, to 5 mm long, with a narrow, dark brown to blackish central band and a paler margin, entire, ciliate; fronds mostly 10–30 cm long, 5–12 cm broad, stipe ± equaling or somewhat longer than blade, ca. 1 mm diam., with one vascular bundle, blackish, terete, rather dull, with ovate-lanceolate scales at base, scales with a brown center and pale margin, cordate; blade ovate-pentagonal, gradually narrowed distally, pinnate-pinnatifid except for lowest pinnae, which are basiscopically produced, coriaceous; upper surface glabrous, lower surface densely white-ceraceous; pinnae 5–10 pairs, lanceolate or linear, with 10–12 pairs of linear-oblong, subacute, adnate segments, these entire, crenulate or often broadly and obtusely lobed ⅔ to costules; sporangia 64-spored, borne on flabellate vein tips, leaf margin somewhat revolute, unmodified.

Limestone bluffs and steep canyons, oak slopes, Tropical Deciduous Forest, Seasonal Evergreen Forest; rare in barrancas bordering Central Depression; 800–1350 m. Western and s Mex. (Chih., Son., Baja C.S., Sin., Jal., Hgo., Pue., Ver., Oax.), Guat., Hond. Chiapas collections are to be referred to var. *candida*; variety *copelandii* (C. C. Hall) Tryon occurs in s Tex. and NE Mex. (Coah., N.L., Tam.). CHIAPAS COLLECTIONS: *21577*; *26976*; *36542*; *39854*; *40591*.

4. **Notholaena cinnamomea** Baker, Syn. Fil., ed. 2, 515. 1874.

—*Cheilanthes cinnamomea* (Baker) Domin, Biblioth. Bot. 20(85):133. 1913. —TYPE: Guatemala, "Motagua," 1862, *Salvin & Godman s.n.* (K! photo GH; isotype BM!).

ILLUSTRATION: Tryon (1956:33).

Rhizome short-creeping to erect, with scales ca. 3 mm long, these subsclerotic with a narrow, pale, entire margin; fronds ca. (7) 15–30 cm long; stipe terete, with one vascular bundle, shorter than or about equal to blade, castaneous, beset with linear, tannish, entire, hairlike scales and pluricellular hairs; blade herbaceous, yellowish green below, darker green above, lanceolate, 5–12 cm long, 2.5–5 cm broad, bipinnate-pinnatifid; pinnae up to 9 pairs, 0.8–1.3 cm broad, the lowest not or only slightly smaller; pinnules 4–7 pairs, obtuse; leaf tissue nearly glabrous on upper surface, beneath loosely beset with long, weak, pluricellular (but not obviously articulate), tannish hairs; sporangia 64-spored, spores yellowish.

Oak slopes, Tropical Deciduous Forest; rare, known from two collections in N Sierra Madre; 800–900 m. Elsewhere known only from Guat. and perhaps Oax. (Mickel, pers. comm.). CHIAPAS COLLECTIONS: *30592*; *36744*.

Tryon (1956) did not comment on the affinities of this species. It seems to me close to *Cheilanthes microphylla,* differing in the slightly planer segment margins, bicolorous rhizome scales, reddish-brown rachis (not blackish), and laxly hairy blades below. If this relationship is correct, it points out again the problem of generic circumscription among the cheilanthoid genera.

5. **Notholaena formosa** (Liebm.) Tryon, Contr. Gray Herb. 179:99. 1956.

—*Allosorus pulchellus* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):47, pl. 10, fig. 1. 1842 (not Presl, 1836). —*Allosorus formosus* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:220. 1849. —*Pellaea pulchella* (Mart. & Gal.) Fée, Gen. Fil. 129. 1852. —*Pellaea formosa* (Liebm.) Maxon, Contr. U.S. Natl. Herb. 24:61. 1922. —TYPE: Mexico, Oaxaca, "Sud de Sola" *Galeotti 6352* (BR! isotype BR!).

ILLUSTRATION: Tryon (1956:97).

Rhizome short-creeping, compact, scales linear, castaneous to brown, entire, thin, concolorous, oily-viscid; fronds ca. 15–40 cm long, stipe terete, reddish brown to atropurpureus, often glaucous, glabrous or with scales similar to those on rhizome, shorter or longer than blade, with one vascular bundle; blade mostly tripinnate, to quadripinnate at base, ovate to long-deltoid to ovate-lanceolate, with 6–9 pairs of pinnae, upper and lower surfaces glabrous, usually glaucous; rachis similar to stipe; pinnae somewhat ascending, basal largest; segments numerous, deltoid-oblong to elliptic, petiolulate, articulate where the dark color of stalk terminates; sporangia 32-spored, borne on apical ¼ of veins, margin strongly revolute, unmodified.

Rocky Pine-Oak slopes, limestone cliffs; uncommon in interior valleys of Central Plateau; 1700–2200 m. Eastern and s Mex. (N.L., Tam., S.L.P., Hgo., Ver., Oax.). CHIAPAS COLLECTIONS: *G 227* (GH, US, PH); *GM 46* (DS); *A 1340* (UC); *EM 5827* (MEXU); *5998*; *13118*.

6. **Notholaena galeottii** Fée, Gen. Fil. 159. 1852.

—TYPE: Mexico, Oaxaca, Caputalpan, *Galeotti 6565* (isotypes at BM, BR, K).

For additional synonymy, see Tryon (1956:54).

ILLUSTRATION: Tryon (1956:55).

Rhizome short-creeping; scales subulate, spinose, black, shining, ca. 2–3 mm long; fronds (15) 20–35 (40) cm tall, with stipe much shorter than blade, 4–10 cm long, terete, blackish, densely covered with blackish spinose-ciliate scales; blade narrowly elliptic, broadest in middle, to 8 cm wide, with 2–4 pairs of slightly reduced pinnae below, bipinnate to bipinnate-pinnatifid, with ca. 18–25 pairs of lateral pinnae; lower surface of blade with dense, tan to ferruginous, long-ciliate scales, these completely obscuring the whitish ceraceous indument; upper surface with scattered, whitish, pluricellular, weak hairs; rachis with scales like those of stipe; pinnae lanceolate, slightly inequilateral, pinnules of basiscopic side more prolonged; sporangia 32-spored, borne along the unmodified margin.

Dry, rocky slopes and flats with Tropical Deciduous Forest; uncommon in Central Plateau bordering Central Depression south and west of La Trinitaria; 900–1100 m. Southern Mex. (S.L.P., Jal., Hgo., D.F., Mlos., Pue., Gro., Oax.). CHIAPAS COLLECTIONS: *41207*; *42146*.

7. **Notholaena incana** Presl, Rel. Haenk. 1:19, pl. 1, fig. 2. 1825.

—LECTOTYPE (chosen by Maxon & Weatherby, Contr. Gray Herb. 127:5. 1939): Mexico, *Haenke s.n.* (PR; photo GH).

ILLUSTRATIONS: Tryon (1956:91); Knobloch & Correll, Ferns Chih. 121. 1962.

Rhizome short, erect or oblique; rhizome scales castaneous, concolorous, lanceolate, long-attenuate, entire, to 1 cm long; fronds mostly 15–40 cm long, ca. 12 cm broad; stipe usually about equaling blade in length, 1.0–1.5 mm diam., blackish, shining, terete, glabrous, with one vascular bundle; blade rather narrowly deltoid, tripinnate (at least toward base), with 6–9 pairs of subopposite pinnae, coriaceous, glabrous and gray-green above, densely white-ceraceous beneath; pinnae deltoid to ovate, long-petiolulate, ultimate segments broadly oblong to ovate, broadly obtuse, truncate, or subcordate at base, articulate where dark color of stalk terminates at base of segment; sporangia 64-spored, borne on the whole length or on apical ⅔ of vein, leaf margin flat, unmodified.

Steep slopes (such as road cuts), in Pine-Oak or Evergreen Cloud Forest; uncommon in s Sierra Madre, Central Plateau; 2100–3000 m. Western and s Mex. (Son., Chih., S.L.P., Jal., Mich., Méx., D.F., Mlos., Pue., Gro., Oax.), Guat., Hisp. CHIAPAS COLLECTIONS: *G 226* (G, GH, Y, not seen; K, PH, seen); *GM 36* (DS); *22768*. Rovirosa cited a collection of *N. nivea*; I have not found the specimen (*R 1067,* Mesa de Coapilla [Northern Highlands], 1800 m), but it is probably *N. incana*.

8. Notholaena sinuata (Lag. ex Swartz) Kaulf., Enum. Fil. 135. 1824.

—*Acrostichum sinuatum* Lag. ex Swartz, Syn. Fil. 14. 1806. —*Gymnogramma sinuata* (Swartz) Presl, Tent. Pterid. 219. 1836. —*Cheilanthes sinuata* (Swartz) Domin, Biblioth. Bot. 20(85):133. 1913. —Type: "Peruvia," collector not stated.

Notholaena laevis Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):46. 1842. —*Notholaena sinuata* var. *integra* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:213. 1849. —Type: Mexico, Oaxaca, "S. du grand bourg de Sola," *Galeotti 6350* (BR! isotypes BR—6 sheets!).

Notholaena pruinosa Fée, Mém. Fam. Foug. 8:78. 1857. —*Notholaena sinuata* var. *pruinosa* (Fée) Fourn., Mex. Pl. 1:120. 1872. —Type: Mexico, vallées de Toluca et d'Orizaba, *Schaffner 167c* (P?).

Illustrations: Tryon (1956:25); Knobloch & Correll, Ferns Chih. 127. 1962.

Rhizome horizontal, thick, densely scaly, scales ferruginous, linear to linear-subulate, pectinate-ciliate to entire; fronds to 70 cm long, (1) 2–5 cm broad, tightly clustered; stipe 3–10 cm long, 2–3 mm broad, terete, at maturity usually less than ¼ length of blade, with two vascular bundles, castaneous, densely and usually persistently clothed with linear light-ferruginous, strongly pectinate scales; blade linear, pinnate to pinnate-pinnatifid, dwindling at base, upper surface sparsely beset with narrow, whitish, very strongly pectinate scales like those of stipe (sometimes reduced to stellate processes), or glabrate, lower surface thickly covered with ferruginous to whitish, imbricate, deltoid to lanceolate, acuminate, short-fimbriate scales to 1.5 mm long overlying a dense tomentum of smaller scales dissected into long, capillary segments; rachis similarly scaly; pinnae 12 or more pairs (35), short-petiolate to 7 mm, eventually articulate, to 3.5 cm long, 1.5 cm broad, entire to sinuate to incised ca. ½ to costa into 4–6 pairs of deltoid to oblong, obtuse entire lobes; sporangia borne along terminal portion of veins, forming a continuous marginal band around pinnae, margin unmodified, flat; 32 spores per sporangium; $n = 87$ (Ariz.), $2n =$ ca. 87 (Zac.), apogamous.

Dry banks and rocky outcrops, Tropical Deciduous Forest, Pine-Oak Forest, Pine-Oak-Liquidambar Forest, Montane Rain Forest; common in Central Plateau, Northern Highlands, edge of Central Depression, uncommon in s Sierra Madre; 800–2300 m. Southern Tex., Ariz., N. Mex., nearly throughout Mex. (Baja C.N., Baja C.S., Son., Chih., Coah., Tam., Sin., Dgo., Zac., S.L.P., Qro., Hgo., D.F., Pue., Ver., Gro., Oax.), Guat., Nic., C.R.; S.A. (Col. to Ven. and NW Arg.); Hisp. Chiapas Collections: *A 1316* (UC, DS); *RMK 3014* (UC, DS, US); *L 102* (DS); *L 814* (DS, US); *T&L 41349* (DS); *GM 37* (DS); *R&R&M 992* (US); *JTM 1223* (US); *C&D 132* (US); *G 212* (BM, GH, Y, K, not seen; PH, seen); *R&R 2052* (US); *Li 1544* (BR); *H 4* (US); *X&S X-577* (US); *R 204* (PH); *EM 5542* (MEXU, US); *EM 197* (MEXU); *We 12930* (MEXU); *RMK 2815* (US); *5999*; *20490*; *21305*; *22414*; *22921*; *26963*; *27421*; *28974*; *40487*; *41793*.

There is a very recent collection of *N. sinuata* var. *pruinosa* (Fée) Fourn. from Chiapas (*Cowan & Hill 1565*, UC, 16 mi. w of San Cristóbal de las Casas, limestone bank). This variety is distinctive in having entire pinnae and perhaps should be recognized as a species (*Notholaena pruinosa* Fée).

Species to Be Looked for in Chiapas

Notholaena affinis (Mett.) Moore —reported from Oax., Guat., and Hond. by Tryon (Rhodora 63:17. 1961). Distinguished from other Chiapas species by the combination of indument of blade wholly waxy below, without hairs; ultimate segments adnate their whole width; stipe and rachis terete, blackish; rhizome scales spinescent-rigid.

Notholaena rosei Maxon —known from Jal. and Oax. Distinguished from other Chiapas species by the combination of indument wholly of whitish wax, without hairs or scales; ultimate segments adnate their whole width; stipe and rachis sulcate adaxially, glandular-pubescent, stramineous except at stipe base.

Notholaena schaffneri (Fourn.) Underw. ex Davenpt. —s Tex. south to Ver., Pue., and Oax.; Jam. Distinguished from other Chiapas species by the indument of whitish wax and also large brown, stiff trichomes; blade elliptic-lanceolate, bipinnate-pinnatifid, the lowermost 2–3 pairs of pinnae slightly reduced.

Notholaena sulphurea (Cav.) J. Smith —reported from Tam. and N.L. to Pue. and Oax., and from Guat. south to Chile (Tryon, 1956). Distinguished from other Chiapas species by the combination of the blade indument being wholly of whitish to yellowish wax below; blade about as broad as long or broader than long, pentagonal usually less than one-third as long as stipe, lower pinnae strongly basiscopically produced.

70. ODONTOSORIA

Odontosoria Fée, Gen. Fil. 325, pl. 27, B, fig. 1. 1852. —Type: *Odontosoria uncinella* (Kunze) Fée [≡*Davallia uncinella* Kunze].

Plants terrestrial, of scandent habit; rhizome creeping, 2–4 mm diam., densely subulate-scaly; fronds elongate-deltoid to linear, to 6 m long, indeterminate, primary rachis subterete to trigonous, often flexuous, smooth or variously spiny; blade 3–4-pinnate, finely dissected in most species, with secondary and tertiary divisions at right angles to axes bearing them; primary pinnae opposite; veins forked, free; sori terminal on veins, 1–3 to each ultimate segment, ± endophyllous; indusia fixed by base and sides, very firm and scarcely different from opposing leaf tissue, forming an urceolate involucre, or in some species partially free laterally; spores globose or globose-tetrahedral, without a perispore; $x =$ ca. 96 (from 48?).

A largely Neotropical genus of 10 species, with 2 species in southern Mexico and Guatemala; Kramer (1972) included 2 additional African species in *Odontosoria*. The greatest number of species is found in the Antilles (6), with single species occurring in Costa Rica and Colombia. *Odontosoria* is very close to *Sphenomeris*, and Kramer (1972) questioned the distinctions between the two genera.

References: Maxon, W. R. 1913. Studies of tropical American ferns.—No. 4. Contr. U.S. Natl. Herb. 17:133–179; Kramer, K. U. 1972. The lindsaeoid ferns of the Old World—IX. Africa and its islands. Bull. Jard. Bot. Nat. Belg. 42:305–345.

Ultimate divisions almost capillary, divaricate, 0.3–0.5 mm broad, linear, or slightly clavate at the monosorous apex .... 2. *O. schlechtendalii*

Ultimate divisions broader, shorter, 0.6–1.0 mm broad, not distinct, cuneately joined in pairs, then again acutely joined, the segments thus in general 2–4 times flabellately parted or cleft, invariably cuneate .... 1. *O. guatemalensis*

1. **Odontosoria guatemalensis** Christ, Bull. Soc. Bot. Genève (2)1:229. 1909.

—Type: Guatemala, Cuesta Grande, "Hacienda de las Nubes," *Bernoulli & Cario 402* (presumably P).

Illustration: **Fig. 61.**

Differs from *O. schlechtendalii* by the characters given in the key. It is apparently a somewhat larger species than *O. schlechtendalii,* judging from the thickness of the stipe and rachis (mostly 2–4 mm in diam.), and the ultimate divisions are shorter, broader, and less divaricate.

Scandent, along roadbanks; uncommon in s Sierra Madre; ca. 1000 m. Known only from Chis. and Guat. Chiapas Collections: *P 6747* (PH, UC, US); *P 6748* (UC, US); *P 6872* (UC, US); *EM 2435* (K, MEXU, US); *31621.*

2. **Odontosoria schlechtendalii** (Presl) C. Chr., Ind. Fil. 209. 1905.

—*Davallia divaricata* Schlecht. & Cham., Linnaea 5:617. 1830 (not Blume, 1828). —*Davallia schlechtendalii* Presl, Tent. Pterid. 129. 1836. —*Stenoloma schlechtendalii* (Presl) Fée, Gen. Fil. 330. 1852. —*Odontoloma schlechtendalii* (Presl) Fourn., Mex. Pl. 1:132. 1872. —*Odontosoria divaricata* (Schlecht. & Cham.) J. Smith, Hist. Fil. 264. 1875. —Type: Mexico, probably Edo. Veracruz (but not stated), *Schiede & Deppe* [803].

Illustrations: Fée, Gen. Fil. pl. 27bis, A, fig. 1. 1852; Hooker, Sp. Fil. 1:pl. 54, C. 1845.

Rhizome short-creeping, with numerous subulate, castaneous, shining scales 2–3 cells broad at base; fronds to 3 m or more long, stipe straight, brownish, 1–3 mm diam., with scales at base similar to those of rhizome, otherwise glabrous and ± shining; rachis, costae, and ultimate axes glabrous, flexuose, especially towards tips, the axes grooved adaxially, the grooves continuous from one axis to the next, unarmed; blade 4-pinnate, ultimate segments ca. 5–8 mm long, 0.5 mm broad, linear or the fertile segments slightly clavate, glabrous; sporangia few per sorus.

Scandent, probably along roadbanks and edges of forests; uncommon in s Sierra Madre; 900–1700 m. Southern Mex. (Gro., Pue., Ver., Oax.), Bel., Guat., Hond. Chiapas Collections: *EM 223* (K, MEXU, US); *EM 18571* (DS, MEXU, US); *X&S X-316* (US).

71. OLEANDRA

Oleandra Cav., Ann. Hist. Nat. 1:115. 1799. —Type: *Oleandra neriiformis* Cav., from the Philippines.

Terrestrial or epipetric; rhizome slender, long-creeping, sometimes climbing, dictyostelic, scaly; fronds articulate at a prominent joint, leaving a short stalk (phyllopodium); blade simple, entire, glabrous to pubescent, costa slightly scaly; veins free, unbranched or forked near base, parallel; sori roundish, borne rather irregularly on veins but most frequent nearest costa, covered by an orbicular to reniform indusium that is attached at the sinus; spores bilateral, with a winged perispore; x = 41, 40?

Pantropical with about 11 species in America (W.I., Chis. to Bol., s Braz.) and perhaps 30 species in the Paleotropics from Africa to Polynesia. In the Neotropics, the center of distribution is Costa Rica (4 spp.) to Colombia and Venezuela. Two species are known from Guatemala, *O. articulata* and *O. guatemalensis,* the latter to be expected on the Atlantic slope in Chiapas.

Reference: Maxon, W. R. 1914. The American species of *Oleandra.* Contr. U.S. Natl. Herb. 17:392–398.

Rhizomes creeping, squarrose-paleaceous .... 1. *O. articulata*

Rhizomes ascending or climbing, appressed-paleaceous .... *O. guatemalensis*

1. **Oleandra articulata** (Swartz) Presl, Tent. Pterid. 78, pl. 2, fig. 12. 1836.

—*Aspidium articulatum* Swartz, J. Bot. (Schrader) 1800(2):30. "1801" [1802]. —Lectotype (chosen by Maxon, Contr. U.S. Natl. Herb. 17:394. 1914): Plumier's Tract. Fil. Amer. pl. 136, illustrating a plant from Martinique. For discussion, see Joncheere, Taxon 18:538–541, 1969.

Aspidium nodosum Willd., L. Sp. Pl., ed. 4, 5:211. 1810, nom. illeg. —*Oleandra nodosa* (Willd.) Presl, Tent. Pterid. 78. 1836. —Type: based on the same plate as *Aspidium articulatum* Swartz; Morton (Amer. Fern J. 58:105–107. 1968) incorrectly applied the name *Oleandra nodosa* to this species.

Illustrations: **Fig. 62**; Tryon, Contr. Gray Herb. 194:242. 1964; Proctor, Fl. L. Antill. 2:193. 1977.

Rhizome with spreading, ferruginous, linear-lanceolate, attenuate scales, giving rhizome a bristly appearance; phyllopodia 5–10 (30) mm long, without scales; blade glabrous, shining, ca. 15 (35) cm long, 3–5 cm broad, mostly with a caudate apex, narrowed below to a broadly cuneate base; indusia glabrous; n = 41 (Jam., P.R., Trin.).

Crevices of sandstone bluffs in Seasonal Evergreen Forest; rare in Northern Highlands; 900 m. Southern Mex. (Chis.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (south to Bol., s Braz.); Antill., Trin. Chiapas Collection: *23583.*

The sole Chiapas collection represents the only record from Mexico. The distribution of *O. articulata* is approximately that of the genus in tropical America.

72. ONOCLEOPSIS

A monotypic genus, presumably most closely related to the North Temperate genera *Onoclea* and *Matteuccia,* less so to *Athyrium*. The sole species is rather rare; Lloyd (1971) cited collections from Edo. Méx., Mlos., Oax., and Guat. *Onocleopsis hintonii* F. Ballard is to be expected in Chiapas in the Sierra Madre.

REFERENCE: LLOYD, R. M. 1971. Systematics of the onocleoid ferns. Univ. Calif. Publ. Bot. 61:1–86.

73. OPHIOGLOSSUM

Ophioglossum L., Sp. Pl. 2:1062. 1753. —LECTOTYPE (first chosen by J. Smith, Hist. Fil. 367. 1875): *Ophioglossum vulgatum* L.
Cheiroglossa Presl, Suppl. Tent. Pterid. 56. "1845" [1846]. —TYPE: *Cheiroglossa palmata* (L.) Presl [≡*Ophioglossum palmatum* L.].

Plants terrestrial or epiphytic; rhizome short, fleshy (without sclerenchyma), siphonostelic to dictyostelic with rather thick succulent roots devoid of hairs, frequently with new plants arising vegetatively from root proliferations; fronds 1 to several, often fleshy, glabrous, consisting of a common stalk and fertile and sterile segments; blade sessile or short-stalked, usually simple and entire (palmately lobed in *O. palmata*); venation areolate, with or without included veinlets; fertile segment consisting of a stalk and a simple spike with imbedded, laterally fused sporangia in two ranks; sporangia large, dehiscent by a transverse suture, producing numerous yellowish spores; gametophytes subterranean, mycorrhizal, cylindrical, lacking chlorophyll.

According to the most recent monographer, *Ophioglossum* consists of 26 species (Clausen, 1938). *Ophioglossum* is subcosmopolitan with many of the species having very wide distributions. Three of the six Chiapas species are essentially pantropical; the remaining three species are primarily temperate in distribution. Altogether, about seven species are known from Mexico (these same seven also recorded from the United States). One additional species occurs in Central America, but two of the temperate species (*O. engelmannii* and *O. vulgatum*) apparently have not been collected south of Chiapas.

Species of *Ophioglossum* commonly occur in damp depressions in meadows. Many botanists have had success finding these inconspicuous plants in old cemeteries.

REFERENCE: CLAUSEN, R. T. 1938. A monograph of the Ophioglossaceae. Mem. Torrey Bot. Club 19:1–177.

a. Plants epiphytic; several fertile spikes usually produced laterally on a single leaf, these pendent; sterile blade variously lobed or divided [subg. *Cheiroglossa* (Presl) Clausen] .... 3. *O. palmatum*

aa. Plants terrestrial; fertile spike one per blade, erect; sterile blade undivided (subg. *Ophioglossum*).

b. Rootstock conspicuously globose-bulbous .... 1. *O. crotalophoroides*

bb. Rootstock cylindrical, subglobose, or tuberous, but never globose-bulbous.

c. Principal veins forming large primary areoles in which are included numerous veinlets forming secondary areoles; sterile blade apiculate at tip .... 2. *O. engelmannii*

cc. Principal veins forming areoles not enclosing smaller secondary areoles, but occasionally with included free veinlets; sterile blade rounded to acute at tip.

d. Blade elliptical or lanceolate; blade fleshy, veins not easily visible .... 6. *O. vulgatum*

dd. Blade ovate, deltoid, or cordate, usually with 4–8 parallel veins passing down through base of blade; blade fleshy to chartaceous.

e. Blade cordate at base; veins usually numerous .... 5. *O. reticulatum*

ee. Blade truncate or contracted at base, lance-ovate in outline; veins not numerous, forming large areoles .... 4. *O. petiolatum*

1. **Ophioglossum crotalophoroides** Walter, Fl. Caroliniana 256. 1788.

—TYPE: based on material from Carolina, collected by *Walter* (presumably BM).
For additional synonymy, see Clausen (1938:157).
ILLUSTRATIONS: Wherry, Southern Fern Guide 253. 1964; D. C. Eaton, Ferns N. Amer. 2:pl. 81. 1880; Stolze, Fieldiana, Bot. 39:11, fig. 2, f–g. 1976.

Plants terrestrial; rootstock globose-bulbous, 4–10 mm diam.; fronds 1–3, 2–11 cm high, with stalks 0.7–2.5 cm long; sterile blade cordate, ovate, abruptly contracted at base, obtuse or rounded at apex, 1–1.5 cm long, 0.8–1.2 cm broad, usually borne horizontally, often folded; venation lax, not easily visible because of thick texture of blade; fertile stalk greatly exceeding sterile blade, 1–7 cm long, with fertile spike 3–11 mm long.

Damp pastures, meadows, open pinelands; in Chiapas, known from a single collection in s Sierra Madre; middle to high elevations in the tropics. Mexico (Nay., Méx., Mich.), Guat., Hond., Nic., C.R.; S.A. (Col. and Ven. to Bol., Urug., Arg., Chile); SE U.S., Hisp. (see Amer. Fern J. 67:121. 1977). CHIAPAS COLLECTION: *X&S X-434* (MEXU).

2. **Ophioglossum engelmannii** Prantl, Ber. Deutsch. Bot. Ges. 1:351. 1883.

—Type: not stated, apparently based on collections from Missouri, *Engelmann s.n.*, and Texas, Comal Co., New Braunfels, *Lindheimer 53* (B?). See Clausen (1938:139).

Illustrations: Wherry, Southern Fern Guide 249. 1964; Britton, Bull. Torrey Bot. Club 24:pl. 319, fig. 2. 1880; Britton & Brown, Ill. Fl. 21. 1952.

Terrestrial; rhizome stout, erect, cylindrical, usually bearing several leaves in a single season, bases of old leaves persisting as a sheath about the rootstock; fronds 5–22 cm tall, with stalk 1–9 cm long; sterile blade elliptical, apiculate at apex, 1–12 cm long, 0.5–3.5 cm broad; veins forming large primary areoles in which are included secondary veinlets forming small secondary areoles; fertile stalk with a stipe 2–12 cm long, with sporangial-bearing portion 1.2–3.5 cm long; sporangia 0.5–1 mm diam.

Wooded slopes (often in limestone regions in other parts of the range); in Chiapas known from two collections from a single locality, Central Plateau; 1000 m. Mexico (Baja C. S., Chih., D.F., Hgo., Jal., Méx., Oax.); E U.S. (NW Va. west to S Ill., thence south to cen. Fla., Tex., and Ariz.). Chiapas Collections: *11729*; *12882*.

3. **Ophioglossum palmatum** L., Sp. Pl. 2:1063. 1753.

—*Cheiroglossa palmata* (L.) Presl, Suppl. Tent. Pterid. 57. "1845" [1846]. —Type: Plumier, Tract. Fil. Amer. pl. 163, 1705, illustrating a plant from Hispaniola.

Illustrations: Wherry, Southern Fern Guide 247. 1964; D. C. Eaton, Ferns N. Amer. pl. 81, figs. 11–14. 1880; Diels, Nat. Pflanzenfam. 1(4):468. 1900; Hooker, Icon. Pl. 1:pl. 4. 1837; Stolze, Fieldiana, Bot. 39:11, fig. 2a. 1976; Proctor, Fl. L. Antill. 2:44. 1977.

Epiphytic; rootstock elongate, 1–2 cm long with hairlike scales, bearing several leaves; fronds 12–76 cm long, with stipe 5–42 cm long; blade 4–35 cm long, 4–30 cm wide, fleshy, palmately lobed or divided, divisions (1) 2–6 (10), lanceolate; fronds with several pendent fertile spikes arising along margins of stalk or near base of blade; fertile spikes (1) 2–10 (16), 1–9 cm long, with stalk 0.2–6 cm long.

Hanging from *Liquidambar* tree; rare in Central Plateau (San Pablo); 2000 m. Southern Mex. (Oax.), Hond., Nic., C.R.; S.A. (Col. to Bol. and Sur., S Braz.); Fla., Antill.; also reported from Madag., Réunion, and Vietnam by Clausen (1938). Chiapas Collection: *GM 172* (DS).

4. **Ophioglossum petiolatum** Hook., Exot. Fl. 1:56. 1823.

—Type: based on cultivated specimens, origin Antilles. For additional synonymy, see Clausen (1938:134).

Illustrations: St. John, Amer. Fern J. 26:53. 1936 [as *O. floridanum* E. St. John]; Wherry, Southern Fern Guide 253. 1964.

Terrestrial; rhizome short, slender, erect, bearing 1 to usually several leaves in a single season; fronds 6–21 cm long, with stalks 2–9 cm long; sterile blade rather thin in texture, lance-ovate, ovate, or elliptical-ovate, acute at apex, obtuse at base, subtruncate, or cuneate, 1.5–6 cm long, 0.6–1.7 cm wide; venation lax, areoles large; fertile stalk 1.5–9 cm long, with sporangial-bearing portion 1–4 cm long; sporangia 0.5–1 mm diam.; n = 480, ca. 510 (O.W.).

Steep banks with Pine-Oak; rare in Central Plateau; 2200 m. Southern Mex. (Chis. only?), C.R.; N S.A.; cen. Fla., Antill., Trin.; trop. Afr. and Asia. Chiapas Collection: *22390* (rather poor specimen).

5. **Ophioglossum reticulatum** L., Sp. Pl. 2:1063. 1753.

—Lectotype (chosen by Proctor, Fl. L. Antill. 2:43. 1977): Plumier's Tract. Fil. Amer. pl. 164, 1705, illustrating a plant from Hispaniola.

Illustrations: **Fig. 63**; Hooker & Greville, Icon. Fil. 1:pl. 20. 1827; Britton, Bull. Torrey Bot. Club 24:pl. 319, fig. 6. 1897; Beddome, Ferns S. India pl. 70. 1863; Stolze, Fieldiana, Bot. 39:11, fig. 2e. 1976; Proctor, Fl. L. Antill. 2:44. 1977.

Terrestrial; rhizome erect, cylindrical, 1–2 cm long, 3–5 mm diam., bearing 1 to rarely several leaves in a growing season; fronds 5–39 cm long, with a common stalk 3–16 cm long; blade sessile or short-stalked, membranaceous, cordate or broadly ovate at base, obtuse or sometimes acutish at apex, 1.5–9 cm long, 1.2–5 cm wide; fertile stalk 5–18 cm long, bearing spike 1–5.5 (7) cm long; sporangia 20–60 pairs, 0.5–1.0 mm diam.; n = ca. 480 (Jam.), 436, ca. 630 (India).

Moist meadows and slopes (Pine-Oak Forest); uncommon in Northern Highlands, Central Plateau, S Sierra Madre; 900–2000 m. Mexico (Sin., Jal., Méx., S.L.P., Oax., Ver.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol., Braz., N Arg.); Antill.; trop. Afr. and Asia. Chiapas Collections: *GM s.n.* (DS); *GM 130* (DS); *EM S-191*, at least in part (K); *EM 1614* (MEXU, US); *T 279* (DS); *6407*; *12751*; *12846*; *29756*.

In Chiapas, *O. reticulatum* is apparently the most common species of the genus. All others are rare or at least overlooked, as is often the case with Adders-tongue ferns.

6. **Ophioglossum vulgatum** L., Sp. Pl. 2:1062. 1753.

—Type: uncertain; based in part on Plumier's Tract. Fil. Amer. pl. B, fig. 5, 1705; LINN 1243.1 is apparently this species but, according to Jackson (1912), was added to LINN after 1755.

For additional synonymy, see Clausen (1938:123).

Illustrations: Wherry, Southern Fern Guide 255. 1964; D.C. Eaton, Ferns N. Amer. 2:pl. 81. 1880; Taylor, Pacific NW Ferns 86. 1970.

Terrestrial; rootstalk short-erect, cylindrical, bearing 1 to rarely several) frond(s); fronds 7–36 cm tall, with stalk 1.5–19 cm long; blade 1–10 (15) cm long, 0.8–4 (6) cm broad, elliptical, usually blunt at apex; fertile stalk 3–17 cm long, with fertile spike 1–4 cm long; sporangia 0.6–1.2 mm diam., to ca. 40 on each side of rachis; n = 240; $2n$ = 480, ca. 496, 500–520 (all O.W.).

Steep moist slopes with Evergreen Cloud Forest; uncommon in Central Plateau; 2700–2800 m. Mexico (Hgo., Pue.); SE Can. and E U.S. (west to Minn. and south to Tex. and Ariz.), isolated stations in Alas. and NW U.S. (Wash. to Calif.); temperate Eur. and Asia. Chiapas Collections: *12911*; *15336*.

Species to Be Looked for in Chiapas

Ophioglossum ellipticum Hook. & Grev. —Bel., Hond., Nic., C.R., Pan.; S.A. (Br. Gui. to Fr. Gui., Braz.). Similar to *O. engelmannii* in the elliptical blade and doubly areolate venation but differing in having a subglobose or tuberous rhizome, blade with a prominent pale median band, and blade apex obtuse or acute instead of apiculate.

Ophioglossum nudicaule L.f. —Mex. (Sin., D.F., S.L.P.), Guat., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui., Braz., Parag., N Arg.); SE U.S., Hisp., Cuba; Afr., trop. Asia, Austral. Fronds small, with elliptic blade inserted toward base of plant; several varieties known; Clausen (1938) reported var. *tenerum* (Mett.) Clausen as the sole variety from Mexico.

74. OSMUNDA

Osmunda L., Sp. Pl. 2:1063. 1753. —Lectotype (first chosen by Leman?, Dict. Sci. Nat. 37:9. 1825): *Osmunda regalis* L.

Osmundastrum Presl, Gefässb. Stip. Farrn 18. 1847. —Type: *Osmundastrum cinnamomeum* (L.) Presl [≡*Osmunda cinnamomea* L.]. See Pichi-Sermolli (Webbia 26:506, 514. 1972) for details of typification of both generic names.

Rhizome and root mass subterranean or partly aerial, forming tussocks in wet ground; fronds in a dense crown, sporophylls taller and more erect, contracted; stipe expanded just above base to form sheathing wings; fronds densely clothed with white to brownish hairs when young, glabrous or nearly so when mature; fronds dimorphous or with dimorphous pinnae; sporangia borne in dense paniculate clusters on ultimate veinlets, large, globose, longitudinally dehiscent, annulus few-celled or wanting; spores chlorophyllous, short-lived, globose-tetrahedral with a trilete scar, without perine; prothalli green, cordate and somewhat elongate, the midrib thickened; $x = 22$.

A cosmopolitan genus of about 15 species, characteristically growing along streams, and in bogs and swamps. Several species, including the two Mexican ones, are widely distributed in both the Old and New Worlds. Three species occur in North America with two of these also in South America.

Osmunda and the Old World genera *Todea* and *Leptopteris* are members of the isolated family Osmundaceae. The fossil record dates back to the Carboniferous.

References: Benedict, R. C. 1909. Osmundaceae. Pp. 27–28 *in* North American Flora 16(1).

Fronds entirely dimorphic, the sporophylls contracted, the sterile fronds pinnate-pinnatifid; pinnae with woolly tufts of hair at their base . . . . 1. *O. cinnamomea*

Fronds partly dimorphic, the sporangia confined to a few distal pinnae with the basal portion of the blade sterile, bipinnate; mature pinnae without woolly tufts of hair at their base . . . . 2. *O. regalis*

1. **Osmunda cinnamomea** L., Sp. Pl. 2:1066. 1753.

—*Osmundastrum cinnamomeum* (L.) Presl, Gefässb. Stip. Farrn 18, pl. 3(4). 1847. —Type: "Marilandia," *Kalm s.n.* (LINN 1244.12).

Illustrations: Small, Ferns SE States 343. 1938; Vareschi, Fl. Venez. 1(1):pl. 31. 1969; Stolze, Fieldiana, Bot. 39:23. 1976.

Fronds dimorphic; fertile frond 50–150 cm long, bipinnate, stipe 15–50 cm long; sterile blade 35–100 cm long, 15–30 cm broad, gradually narrowed into a pinnatifid apex above, deeply pinnate-pinnatifid; pinnae 1.5–4 cm broad, sessile, glabrous when mature, opposite to subopposite, cut into subfalcate, oblique segments, rounded or acutish at tip; veinlets 1-forked; stipe and rachis glabrous when mature, but with tufts of brownish tomentum at base of each pinna; $n = 22$ (Jam., C.R.).

Marshes and swamps; uncommon in Central Plateau; 900 m. Southern Mex. (Oax., Ver.), Guat., Hond., C.R.; S.A. (Col. and Ven. to s Braz.); e N.A.; Gr. Antill.; e Asia. Chiapas Collections: *G 300* (K); *22198*.

2. **Osmunda regalis** L., Sp. Pl. 2:1065. 1753.

—Type: "habitat in Europa, Virginia." Apparently needs lectotypification; LINN 1244.8 (Smolandia, *Rolander*) and LINN 1244.9 (Virginia, *Kalm*) are this species; according to Jackson (1912), however, these collections were not in LINN until after 1755.

Osmunda spectabilis Willd., L. Sp. Pl., ed. 4, 5:98. 1810. —*Osmunda regalis* var. *spectabilis* (Willd.) Gray, Man. Bot. N. United States, ed. 2, 600. 1856. —Type: "habitat Pensylvania," *Mühlenberg s.n.* (B—Herb. Willd. 19504).

Osmunda mexicana Fée, Mém. Fam. Foug. 9:43. 1857. —Type: Mexico, Oaxaca, *Galeotti 6388* (presumably P).

Osmunda palmeri A. Bobr., Novit. Syst. Pl. Vasc. 1968:8. 1968. —Type: Mexico, Jalisco, Río Blanco, *Palmer 660* (LE; isotypes GH, K! UC!).

Illustrations: **Fig. 64**; Small, Ferns SE States 341. 1938; Rovirosa, Pterid. Sur Mex. pl. 63. 1909; Vareschi, Fl. Venez. 1(1):pl. 31. 1969; Stolze, Fieldiana, Bot. 39:22. 1976.

Fronds 35–180 cm long, 20–30 cm broad, bipinnate, sterile pinnae with a conform terminal segment, fertile pinnae occupying distal one-fourth of blade, greatly contracted and more erect than sterile pinnae; sterile pinnules oblong with oblique or subcordate base, obtuse to acute at tip; $n = 22$ (Chis., C.R.).

Marshes and along streams, slopes with Pine-Oak; locally common in Eastern and Northern highlands, Central Plateau, Central Depression; 800–2700 m. Southern Mex. (Hgo., Jal., Méx., Ver., Oax.), Guat., Hond., Nic., C.R.; S.A. (Col. and Ven. to s Braz., nw Arg.); e U.S., Antill.; Eur., Asia, S. Afr. Chiapas Collections: *MC 1831* (US); *R 1062* (PH); *EM 15903* (MEXU); *EM 5903* (US); *S 45-467* (MEXU, US); *P 10201* (US); *GM 20* (DS); *T&L 41713* (DS); *T 959, 1281, 2520* (DS); *G 299* (K); *9810*; *14956*; *21337*; *22220*; *32148*; *32458*; *33041*; *40858*; *41352*.

75. PELLAEA

Pellaea Link, Fil. Sp. Hort. Bot. Berol. 59. 1841 (nom. cons.). —Lectotype (first chosen by Christensen, Ind. Fil. xxxix. 1906): *Pellaea atropurpurea* (L.) Link [≡*Pteris atropurpurea* L.]. See Pichi-Sermolli, Webbia 9:428. 1953.

Rhizome creeping to compact and multicipital, dictyostelic, densely clothed with narrow, linear to subulate, concolorous or bicolorous scales; fronds 1–4-pinnate, often imparipinnate, segments articulate or not, monomorphic or subdimorphic, thick-herbaceous to coriaceous; stipe and rachis tan to black, usually glabrous, smooth, without wings or conspicuous scale scars, usually not articulate; veins free (rarely anastomosing), forked, usually ending in a clavate tip; sori intramarginal, terminal on veins, elongate, ultimately confluent laterally, ± hidden by the continuous, revolute blade margin; sporangia short- to usually long-stalked, usually without paraphyses; spores globose, trilete, yellowish tan to brown, smooth or rugose; $x = 29$.

The circumscription of *Pellaea* is rather unsatisfactory at present. Most New World species form a rather close-knit group of about 16 species that is easily definable (sect. *Pellaea* of Tryon, 1957). However, there are a few aberrant elements generally included in *Pellaea*, e.g., *P. skinneri* and *P. seemannii* in Mexico and also most Old World species. Copeland (1947) allowed about 80 species in the genus, but the actual number is probably much smaller, perhaps about 30. The center of distribution in the New World is western United States and Mexico; in the Old World it is Africa, with a small species concentration in the Austral region.

Pellaeas usually grow in rather dry, rocky, somewhat protected places.

REFERENCES: TRYON, A. 1957. A revision of the fern genus *Pellaea* section *Pellaea*. Ann. Missouri Bot. Gard. 44:125–193; 1972. Spores, chromosomes, and relations of the fern *Pellaea atropurpurea*. Rhodora 74:220–241.

a. Stipe and rachis castaneous to black, lustrous.
  b. Rhizome scales concolorous; stipe and rachis terete or elliptical .... 1. *P. atropurpurea*
  bb. Rhizome scales bicolorous with a sclerotic central stripe or base; stipe and rachis sulcate, convex or plane on upper surface .... 7. *P. ternifolia*
aa. Stipe and rachis stramineous to ruddy brown, or darker at base and mottled above, dull.
  c. Ultimate segments rotundate to cordate to sagittate, entire, short-stalked.
    d. Rhizome moderately stout, compact, fronds approximate; rachis not flexuous; scales of stipe base broad, cordate or pseudopeltate.
      e. Segments rotundate-cordate; rachis and segment stalks glabrous; spores 64 per sporangium, tetrahedral-globose, 37–53 μm at broadest diameter .... 2. *P. cordifolia*
      ee. Segments ovate-triangular to sagittate; rachis and segment stalks usually puberulous; spores 32 per sporangium, ellipsoidal, 53–106 μm at broadest diameter .... 4. *P. sagittata*
    dd. Rhizome usually slender, cordlike and creeping, or moderately stout and compact, fronds distant or approximate; rachis and pinna-rachises strongly flexuous; stipe base scales slender, acicular to lanceolate-triangular .... 3. *P. ovata*
  cc. Ultimate segments oblong, variously incised, sessile, adnate to axis.
    f. Blade longer than stipe, linear to lanceolate, bipinnate-pinnatifid .... 5. *P. seemannii*
    ff. Blade as long as or shorter than the stipe, deltoid, tripinnate-pinnatifid .... 6. *P. skinneri*

1. **Pellaea atropurpurea** (L.) Link, Fil. Sp. Hort. Bot. Berol. 59. 1841.

—*Pteris atropurpurea* L., Sp. Pl. 2:1076. 1753. —*Allosorus atropurpureus* (L.) Kunze ex Presl, Tent. Pterid. 153. 1836. —*Platyloma atropurpurea* (L.) J. Smith, J. Bot. (Hooker) 4:160. 1841. —TYPE: Virginia, *Kalm s.n.* (LINN 1246.18).

ILLUSTRATIONS: Tryon (1957:145); Knobloch & Correll, Ferns Chih. 69. 1962.

Rhizome compact, decumbent, densely clothed with long-attenuate, appressed, concolorous, rusty scales; fronds subdimorphic, 6–50 cm long, erect to erect-spreading, stipe and rachis terete or elliptical, atropurpureous to blackish, subglabrous to pubescent with appressed flexuous hairs; blade deltoid-ovate to lanceolate, simply pinnate to bipinnate below, 5–25 cm long, 1.5–18 cm broad, coriaceous, dull green, glabrous or sparingly fibrillose beneath, especially along veins; ultimate segments sessile to short-stalked, 1–7.5 cm long, 0.5–1.0 cm broad, elliptical to linear-oblong to lanceolate, entire, sometimes auriculate acroscopically, or ternately lobed, fertile segments revolute-margined with apex blunt to mucronate, usually narrower than segments of sterile blade; sporangia 32-spored, spores globose to somewhat ellipsoidal, yellow, with a prominent rugose-reticulate exospore; $2n = 87$, apogamous (numerous localities).

Rocky canyons and Pine-Oak slopes, also exposed or shaded ledges and crevices of limestone cliffs; uncommon in drier areas of Northern Highlands, Central Plateau; 1200–2500 m. From Vt. and s Que. to S.D., south to N Fla. and Ariz., widely scattered in Mex. (Chih., Coah., N.L., Son., Tam., Oax., Pue., Ver.), Guat. CHIAPAS COLLECTIONS: *GM 77* (DS, US); *G 216* (F, GH, K, PH, YU, only K and PH seen); *37179*; *38729*; *40739*.

2. **Pellaea cordifolia** (Sessé & Moc.) A. R. Smith, Amer. Fern J. 70:26. 1980.

—*Adianthum cordifolium* Sessé & Moc., Naturaleza (Mexico City) (2)1(App.):182. 1890. —TYPE: Mexico, Cuyuacan and San Agustin near Mexico City. According to Morton (Amer. Fern J. 45:151. 1955), type specimens are not in the Sessé and Mociño Herbarium at MA but may be in the general herbarium there.

Pteris cordata Cav., Descr. Pl. 267. 1802. —*Pellaea cordata* (Cav.) J. Smith, Cat. Kew Ferns 4. 1856 (not Fée, 1852). —*Pellaea cardiomorpha* Weath., J. Arnold Arbor. 24:309. 1943. —*Pellaea sagittata* (Cav.) Link var. *cordata* (Cav.) A. Tryon, Ann. Missouri Bot. Gard. 44:166. 1957. —TYPE: Mexico, Chapultepec, *Née s.n.* (MA; isotype F).

ILLUSTRATIONS: Matuda, Anales Inst. Biol. Univ. Nac. México 27:94. 1956; Tryon (1957:167); Rovirosa, Pterid. Sur Mex. pl. 15. 1909.

Similar to *P. sagittata*, distinguished from that species by characters given in the key; sporangia 64-spored; $n = 29$ (D.F.).

Known in Chiapas from a single collection, "montañas basálticas de Tapalapa" on the Mesa de Coapilla, a dry plateau in the Northern Highlands; 1800 m. Texas, throughout Mex. (Chih., Coah., D.F., Gto., Hgo., Méx., Mich., Mlos., N.L., Oax., Pue., Qro., S.L.P., Zac.). CHIAPAS COLLECTION: *R 209* (PH).

The Chiapas specimen has about 64 spores per sporangium and so is a presumed sexual diploid. This is apparently the southernmost record for *P. cordifolia*. See *P. sagittata* for additional discussion.

3. **Pellaea ovata** (Desv.) Weatherby, Contr. Gray Herb. 114:34. 1936.

—*Pteris ovata* Desv., Mém. Soc. Linn. Paris 6:301. 1827. —Type: Peru, collector not stated, herb. Desv. (P!; photos GH, UC!).

Pteris flexuosa Kaulf. ex Schlecht. & Cham., Linnaea 5:614. 1830. —*Allosorus flexuosus* (Schlecht. & Cham.) Kunze, Linnaea 13:136. 1839. —*Pellaea flexuosa* (Schlecht. & Cham.) Link, Fil. Sp. Hort. Bot. Berol. 60. 1841. —*Platyloma flexuosa* (Schlecht. & Cham.) J. Smith, Bot. Mag. 72:Comp. 21. 1846. —Type: Mexico, near Jalapa, Aug 1828, *Schiede & Deppe s.n.* (B).

Illustrations: Tryon (1957:175); Knobloch & Correll, Ferns Chih. 73. 1962.

Rhizome slender, cordlike, creeping or compact; rhizome scales appressed, tan to dark brown, these and those of stipe bases bicolorous, lanceolate, apex filiform, cordate, sclerotic central portion lustrous, margin pectinate to erose-serrulate, ± tortuous; fronds 10–125 cm long, straight or frequently subscandent, monomorphic; stipe and rachis convex or plane adaxially, glabrous or pubescent, stramineous to ruddy-brown, becoming gray with age, rachis strongly flexuous; blade 15–84 cm long, 2–30 cm broad, elongate-triangular, bi- to quadripinnate, usually tripinnate, pinnae descending at broad angles to rachis, divided into 5–60 or more segments, long-stalked, costae to 14 cm long, strongly flexuous; segments 0.5–4.5 cm long, 0.3–2.5 cm broad, ovate-triangular, sagittate or cordate, coriaceous, glabrous or sparsely pubescent, apex obtuse or somewhat mucronate; sporangia 32- or 64-spored, spores ellipsoidal to tetrahedral-globose, yellow with prominent light brown rugose exospore; *n* = 29 (Tex., C.R.), apogamous races also known (2*n* = 87).

Shaded limestone rocks with Pine-Oak woods; uncommon in Central Plateau; 1300–2500 m. Texas, throughout Mex. (Baja C.N., Chih., Coah., D.F., Dgo., Gto., Gro., Hgo., Jal., Méx., Mich., Mlos., N.L., Oax., Pue., Qro., S.L.P., Son., Tam., Ver.), Guat., Hond., Nic., C.R.; S.A. (Ven. and Col. to nw Arg.); Hisp. Chiapas Collections: *G 204* (GH, PH, US, the last two seen); *L&S 9907* (US); *GM 35* (DS, US); *A 1312* (DS, UC); *A 1312A*, pt. (US); *A 1342* (UC); *11087*; *39908*.

4. **Pellaea sagittata** (Cav.) Link, Fil. Sp. Hort. Bot. Berol. 60. 1841.

—*Pteris sagittata* Cav., Descr. Pl. 267. 1802. —*Allosorus sagittatus* (Cav.) Presl, Tent. Pterid. 153. 1836. —*Platyloma sagittata* (Cav.) J. Smith, J. Bot. (Hooker) 4:160. 1841. —Type: Mexico, Cerro de Guadeloupe, *Née s.n.* (MA).

Illustrations: Tryon (1957:169); Knobloch & Correll, Ferns Chih. 77. 1962.

Rhizome stout, compact, decumbent, densely clothed with tan to ferruginous, concolorous, sparsely pectinate scales with long, often retrorse teeth, tortuously long-setaceous at apex, usually cordate at base, ca. 5 mm long; fronds slightly dimorphic, 16–78 cm long; stipe and rachis convex or plane adaxially, glabrous to puberulous, stramineous to ruddy-tan, becoming darker with age, stipe sparsely and deciduously scaly towards base, rachis straight or subflexuous; blade 10–46 cm long, 5.5–32 cm broad, ovate-triangular to rhomboid, pinnate or bipinnate, rarely tripinnate, light green, pinnae at a broad angle to rachis or ascending, entire or divided into 3–18 segments, long-stalked, costae to 10 cm long, subflexuose; ultimate segments to 5.5 cm long, 0.5-2.8 cm broad, ovate-triangular to sagittate, entire, herbaceous to subcoriaceous, glabrous or puberulent on under surface and along margin of upper surface; veins evident; sporangia 32-spored, spores tetrahedral-globose, yellow to light brown, exospore of sparse, prominent rugae; *n* = 2*n* = 87, apogamous (Mich.).

Shaded limestone banks and steep canyons; uncommon in Central Plateau, s Sierra Madre; 2100–2400 m. Southwestern Tex., Mex. (Chih., D.F., Hgo., Jal., Méx., Mich., Mlos., Oax., Pue., Tlax., S.L.P., Zac.), Guat.; S.A. (Col. to Bol.). Chiapas Collections: *G 303* (F, GH, K, PH, YU, only K and PH seen); *A 1312A*, pt. (UC); *P 7248* (UC, US); *GM 17* (DS); *EM 4888* (MEXU); *JTM 1225* (US); *40463*.

I exclude from this species Tryon's var. *cordata*, which I recognize as a distinct species (*P. cordifolia*). The two can be distinguished by the characters given in the key. In addition, *P. sagittata* is an apogamous triploid, with 32 spores per sporangium, while *P. cordifolia* is a sexual diploid, with 64 spores per sporangium. *Pellaea sagittata* s.s. has also a much wider distribution than *P. cordifolia*. The morphological, chromosomal, and chorological differences between the two taxa seem of a magnitude to justify recognition of two species.

Tryon (1957) suggested that *P. sagittata* var. *sagittata* originated as a hybrid between *P. ovata* and *P. sagittata* var. *cordata* (my *P. cordifolia*).

5. **Pellaea seemannii** Hook., Sp. Fil. 2:141, pl. 117B. 1858.

—Type: Mexico, Sinaloa, Mazatlán, *Seemann 1447* (K!).

Illustrations: **Fig. 56**; Knobloch & Correll, Ferns Chih. 79. 1962.

Rhizome short, thick, decumbent, densely scaly; rhizome scales lanceolate, acuminate-attenuate, with a dark brown or blackish center and light brown margin; fronds 10–35 cm long, to 8 cm broad; stipe short, 2.5–10 cm long, 1–2 mm diam., pale brown or grayish brown, slightly scaly at base and often rusty-pubescent adaxially, rachis similar; blade to 25 cm long, membranaceous, subglabrous to sparsely pubescent, longer than stipe, elliptic-lanceolate to narrowly lanceolate, bipinnate to bipinnate-pinnatifid; pinnae 12–20 pairs, alternate to subopposite, sessile or with lower ones short-stalked, lanceolate, pinnate below to essentially entire toward apex; ultimate segments triangular to narrowly ovate, sometimes slightly lobulate; sori continuous along lateral margins but not at very apex of segments; indusia formed by the slightly inrolled margin of the segments.

Rocky slopes and dry ravines with Deciduous Forest; Pacific Coastal Plain, lower elevations of Sierra Madre and where it adjoins Central Depression; 130–1100 m. Western and s Mex. (Baja C.S., Chih., Son., Sin., Nay., Cma., Jal., Méx., Mlos., Mich., Gro., Oax.). Chiapas Collections: *P 6728* (UC, US); *36811*; *41797A*.

This and a few related species (e.g., *P. allosuroides*, *P. skinneri*) are the most aberrant New World elements within *Pellaea* and in some respects approach *Cheilanthes* (particularly the group of *C. microphylla*) more closely than they do *Pellaea*. Their ultimate disposition must await a comparative study of the generic limits of the numerous cheilanthoid genera.

Throughout Mexico, there is a variant of *P. seemannii* that has smaller segments rounded at the tip, lacks a large triangular terminal segment, and has more or less sessile pinnae. This variant seems to grow at higher elevations than *P. seemannii* and approaches *P. allosuroides* in dissection. I have seen a single Chiapas collection fitting this description; it lacks precise locality data: *GM s.n.* (DS). It possibly represents an undescribed species.

6. **Pellaea skinneri** Hook., Sp. Fil. 2:141, pl. 118B. 1858.

—TYPE: Guatemala, *Skinner s.n.* (K!).

ILLUSTRATIONS: see original; also Knobloch & Correll, Ferns Chih. 79. 1962.

Rhizome short, thick; rhizome scales subulate, with a dark brown to blackish central stripe, the margin tan and somewhat comose; fronds to 45 (75) cm long, 45 cm broad; stipe to 35 cm long, about equaling blade, 2–5 mm diam., stramineous, with dark acicular scales at base, otherwise glabrous or glabrescent; blade deltoid, bipinnate-pinnatifid to tripinnate-pinnatifid at base; pinnae mostly 5–8 pairs, largest deltoid, alternate, long-stalked to 5 cm; ultimate segments oblong to ovate, acutish at tip; veins readily visible on both sides; leaf tissue glabrous on both sides or sometimes sparsely hairy and with a few linear-lanceolate scales below, herbaceous; sori at tips of veins, usually confluent and continuous except at tips of segments and sinuses; indusia formed by the modified, whitish, inrolled segment margin.

Slope with *Quercus*, Tropical Deciduous Forest; rare, edge of Central Depression and N Sierra Madre; 900 m. Western Mex. (Baja C.S., Chih., Sin., Nay., Jal., Gro., Mlos., Oax.), Guat., Salv., C.R. CHIAPAS COLLECTION: *36706*.

7. **Pellaea ternifolia** (Cav.) Link. Fil. Sp. Hort. Bot. Berol. 59. 1841.

—*Pteris ternifolia* Cav. Descr. Pl. 266. 1802. —*Platyloma ternifolia* (Cav.) J. Smith, Bot. Mag. 72:Comp. 21. 1846. —*Allosorus ternifolius* (Cav.) Kunze ex Klotzsch, Linnaea 20:339. 1847. —LECTOTYPE (chosen by Christensen, Dansk. Bot. Ark. 9(3):22. 1937): Peru, near Guamantanga, *Née s.n.* (MA; isotype F).

Pellaea brandegeei C. C. Hall, Amer. Fern J. 37:111, photo 112. 1947. —TYPE: Mexico, Baja California Sur, Cape region, Sierra de la Laguna, 1893, *Brandegee s.n.* (UC! isotype US).

ILLUSTRATIONS: Tryon (1957:151); Knobloch & Correll, Ferns Chih. 81. 1962; Matuda, Anales Inst. Biol. Univ. Nac. México 27:91. 1956.

Rhizome moderately stout, decumbent, densely clothed with appressed, often bicolorous scales, brownish to tan at margin and tip, with a dark sclerotic central stripe, margin irregularly dentate or erose, apex attenuate to filiform; fronds monomorphic or subdimorphic, 4–50 cm long, erect; stipe and rachis convex to plane to sulcate adaxially, rarely terete, glabrous or rarely pubescent with appressed hairs, glaucous, castaneous to ebeneous with age; blade linear, 3–32 cm long, 0.5–6 cm broad, pinnae sessile to short-stalked, mostly opposite, ca. 9–15 pairs, all but uppermost ones trifoliate (pseudoverticillate); ultimate segments elliptic to linear-oblong to linear, usually mucronate, to 3.5 cm long, 6 mm wide, sterile segments broader than the fertile, glabrous, margin reflexed at maturity; sporangia 64-spored, spores globose to tetrahedral-globose, yellow to tan, with a low-rugose to relatively smooth perine; $n = 29$ (Mlos., D.F.), 58 (Dgo., Méx.).

Rock crevices, in sun or semi-shade; rare in s Sierra Madre and Northern Highlands, reported by Rovirosa (Pterid. Sur Mex. 133. 1909) as from "montañas templadas de Bochil y el Sacramento"; 1400–2100 m. Widespread, from s Ariz. and Tex. through Mex. (Baja C.S., Chih., Coah., Dgo., Gto., Gro., Hgo., Jal., Méx., Mich., Mlos., Nay., Oax., Qro., Pue., S.L.P., Sin., Son., Tlax., Ver., Zac., D.F.), Guat., Nic.; S.A. (Col. and Ven. to N Arg. and Chile); Hisp.; Haw. CHIAPAS COLLECTIONS: *R 1083* (not found at K, MEXU, PH); *40471*.

The chromosome report of $2n = 56$ II (Smith & Mickel, Brittonia 29:394. 1977) for a plant from Durango is erroneous; a recount of the same material shows unambiguously $2n = 58$ II.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Pellaea allosuroides (Mett.) Hieron. —Chih., Baja C.S., Dgo., Sin., Nay., Jal., Mlos., Mich., Méx., Oax., Pue., Ver. Most closely related to *P. seemannii*, differing from that species in the concolorous, ferruginous rhizome scales, sessile to nearly sessile pinnae, smaller ultimate segments, castaneous to atropurpureous, shining rachis, and glabrous leaf tissue on both sides. With equal justification, *P. allosuroides* might be placed in *Cheilanthes*.

76. PELTAPTERIS

Peltapteris Link, Fil. Sp. Hort. Reg. Bot. Berol. Cult. 147. 1841. —TYPE: *Acrostichum peltatum* (Swartz) Swartz [≡*Peltapteris peltata* (Swartz) Morton].

Rhipidopteris Schott ex Fée, Mém. Fam. Foug. 2:14. 1845 (nom. illegit.).

Plants epiphytic; rhizome long-creeping, slender, branching, scaly; fronds dimorphic, the sterile flabellate to pinnate, ± finely dissected, the fertile smaller, roundish to cordate, with sporangia covering surface (acrostichoid); paraphyses absent; spores reniform, with an angular perispore.

Four species in tropical America, from southern Mexico to Peru and Antilles. Only the most wide-ranging species, *P. peltata*, has been found in Mexico; two species occur in Costa Rica and three in Ecuador. A fourth species has recently been described by Gómez (Revista Biol. Trop. 18:217–220. 1971) from Peru; it has pinnate fronds with forked segments and, according to Gómez, bridges the gap between *Elaphoglossum* and *Peltapteris*. Many other authors, including Copeland (1947), have commented on the close relationship between these two genera.

REFERENCE: MORTON, C. V. 1955. Notes on *Elaphoglossum*, III. The publication of *Elaphoglossum* and *Rhipidopteris*. Amer. Fern J. 45:11–14.

1. Peltapteris peltata (Swartz) Morton, Amer. Fern J. 45:13. 1955.

—*Osmunda peltata* Swartz, Prodr. Veg. Ind. Occ. 127. 1788. —*Acrostichum peltatum* (Swartz) Swartz, J. Bot. (Schrader) 1800(2):11. "1801" [1802]. —Type: Jamaica, presumably *Swartz s.n.* (S?).

Illustrations: **Fig. 40**; Rovirosa, Pterid. Sur Mex. pl. 58, figs. 1–3. 1909; Proctor, Fl. L. Antill. 2:196. 1977.

Rhizome 0.5–1.0 mm diam., greenish but usually obscured by tan, ovate, ± appressed to slightly spreading scales 1–2 mm long; stipes distant, mostly 1–3 cm or more apart, greenish, scaly; sterile fronds to ca. 12 cm long, flabellate, ± dichotomously forking 3–4 times, divisions linear, ca. 1 mm or less broad; fertile fronds less numerous, longer-stiped, with a roundish to subcordate or somewhat 4-lobed blade 6–14 mm wide; leaf tissue below with small, appressed, substellate, tan scales; spores brown to blackish.

Epiphytic in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, less often Evergreen Cloud Forest, Seasonal Evergreen Forest; common in Northern Highlands, Central Plateau and Sierra Madre, uncommon in Eastern Highlands; 800–2300 m. Southern Mex. (Hgo., Ver., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Guy. and Ecu.); Antill. Chiapas Collections: *Dr 1604* (MEXU); *R 848* (PH); *EM 5122* (MEXU); *EM 1859* (MEXU); *EM 2385* (MEXU); *Z 200* (DS); *GM 124* (DS); *T 2815* (DS); *R&B 20021* (DS, US); *15004*; *21488*; *21662*; *21856*; *22353*; *22602*; *27988*; *28901*; *30076*; *30877*; *31877*; *32281*; *33587*; *38916*.

77. PHANEROPHLEBIA

Phanerophlebia Presl, Tent. Pterid. 84. 1836. —Type: *Phanerophlebia nobilis* (Schlecht. & Cham.) Presl [≡*Aspidium nobile* Schlecht. & Cham.].

Plants terrestrial or saxicolous; rhizome short-creeping to suberect, scaly; stipe with numerous vascular bundles, with a few persistent scales at base and sometimes distally; blade imparipinnate, at least proximal pinnae short-stalked; pinna margins entire to spinulose in most species; blade chartaceous to subcoriaceous, glabrous or with a few minute scales; veins forking, free to anastomosing; sori round, usually in several series; indusia present (or in a few species absent), peltate, persistent or caducous; spores bilateral, monolete, with a winged perispore, $x = 41$.

In the strict sense, a genus of about eight American species, distributed from Arizona to Texas, south through Mexico and Central America to Venezuela; also Hispaniola. All species apparently occur in Mexico (but see under *P. juglandifolia*), which is the center of diversity of the genus.

Copeland (1947) expressed doubts about the validity of the character used to distinguish *Phanerophlebia* (free veins) from *Cyrtomium* (united veins), a primarily eastern Asiatic genus of about 9 species (Christensen, Amer. Fern J. 20:41–52. 1930), although Shing (Acta Phytotax. Sin., Suppl. I. 1–48. 1965) recognized 59 species. Several species of *Phanerophlebia* do have anastomosing veins, making this distinction between the two genera untenable. The presence of a *Cyrtomium*-like species in the Andes further compounds the problem of generic circumscription. I maintain the two as distinct primarily as a matter of convenience. If they are united, the generic name *Cyrtomium* must be used (see Morton, Amer. Fern J. 57:52–55. 1957).

References: Underwood, L. M. 1899. American ferns—II. The genus *Phanerophlebia*. Bull. Torrey Bot. Club 26:205–216; Maxon, W. R. 1912. Notes on the North American species of *Phanerophlebia*. Bull. Torrey Bot. Club 39:23–28.

a. Veins regularly anastomosing.
  b. Lateral pinnae mostly 1–4 pairs; pinnae spinulose only in distal third; pinnae mostly 3–5 cm broad; buds present or absent; exindusiate .... 1. *P. juglandifolia*
  bb. Lateral pinnae mostly 5–13 pairs; pinnae spinulose along their entire length; pinnae mostly 1.5–3 cm broad; buds absent; indusiate to seemingly exindusiate .... 5. *P. remotispora*
aa. Veins free, or only casually anastomosing at or near margin.
  c. Lateral pinnae (3) 6–17 pairs; stipe scales stramineous to tan, overlapping, ovate .... 3. *P. macrosora*
  cc. Lateral pinnae 0–3 (4) pairs; stipe scales brown or castaneous, not overlapping.
    d. Pinnae rounded to cuneate at base; stipe base with relatively few ovate scales; leaf tissue chartaceous .... 2. *P. lindenii*
    dd. Pinnae subcordate at base or auriculate acroscopically; stipe base with rather dense, filiform scales; leaf tissue subcoriaceous .... 4. *P. pumila*

1. Phanerophlebia juglandifolia (Humb. & Bonpl. ex Willd.) J. Smith, J. Bot. (Hooker) 4:187. 1841.

—*Polypodium juglandifolium* Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:195. 1810. —*Cyrtomium juglandifolium* (Humb. & Bonpl. ex Willd.) Moore, Ind. Fil. lxxxiii. 1857. —Type: Venezuela, "Caripe," *Humboldt & Bonpland s.n.* (B—Herb. Willd. 19688, sheets 1a, 1b; isotypes P—2 sheets!).

Illustrations: Presl, Tent. Pterid. pl. 7, fig. 22. 1836; Kunth, Nov. Gen. et Sp. Pl. 7:pl. 665. 1825; Underwood (1899:pl. 359, 360).

Rhizome short, suberect; fronds mostly 60–90 cm long; stipe equaling or longer than blade, 2–4 mm diam., with a few, brownish, ovate scales mostly 5 mm or less long; blade 20–45 cm long, with 1–4 (6) pairs of lateral pinnae; rachis glabrous or glabrescent, with or without a bud in axil of a distal pinna; pinnae subfalcate, to 20 cm long and 5 cm broad, terminal conform, often the largest, elliptic to ovate, ± equilateral, base rounded to cuneate; pinna margin entire to spinulose only at tip; veins anastomosing about midway between costa and margin; leaf tissue and veins below glabrous or with a very few, minute, scattered scales; sori 1–2 mm diam., in 3–4 rows, first row 2–3 mm from costae, apparently exindusiate; $n = 41$ (Oax.).

In Lower Montane and Montane rain forests, Evergreen Cloud Forest; uncommon in Northern and Eastern highlands, Central Plateau, Sierra Madre; 800–2700 m. Southern Mex. (Chis. only?), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col.). CHIAPAS COLLECTIONS: *Dr 1613* (NY, US); *21652*; *24996*; *26778*; *26840*; *30867*; *31495*; *32942*; *34400*; *34692*; *34698-A*; *41708*; *42564*.

Most specimens from South America (including an isotype) and some from Panama have a bud in the axil of an upper pinna; only two (*41708*; *42564*) of the Chiapas specimens are gemmiferous. There seem to be other small differences between plants of the two areas, and it may be that they represent distinct species.

Another problem with this species in southern Mexico is that it intergrades with *P. remotispora*. In fact the intermediates, discussed under *P. remotispora*, are apparently more common than either *P. juglandifolia* or *P. remotispora*. *Ghiesbreght 414*, referred to *P. juglandifolia* by Underwood (1899), I believe is one of these intermediates.

2. **Phanerophlebia lindenii** Fourn., Mex. Pl. 1:100, pl. 4. 1872.

—Type: Mexico, Chiapas, "in pineto pr. Ciudad Real" [San Cristóbal Las Casas], *Linden s.n.* (P!). *Linden 1551* (K!) is probably the same collection.

Phanerophlebia haitiensis C. Chr., Kongl. Svenska Vetenskapsakad. Handl. (3)16(2):42, pl. 10, figs. 1–4. 1937. —*Cyrtomium haitiense* (C. Chr.) Morton, Amer. Fern J. 47:55. 1957. —TYPE: Haiti, Selle, M. La Selle, above Badeau, *Ekman H3119* (S; isotype BM!).

ILLUSTRATIONS: see original and under synonym cited.

Incompletely known; similar to *P. pumila* but with stipe scaly only at base, scales ovate to lanceolate, not filiform; 1–2 pairs of lateral pinnae 5–8 cm long, these elliptic to lanceolate, not subcordate, spinulose along margin; veins free or only casually anastomosing at or near margin; leaf tissue chartaceous.

In Pine-Oak Forest; rare in Central Plateau; ca. 2300 m. Known only from the type and apparently also from Haiti.

The affinities of this species are unclear, at least in part because of the paucity of material, but also because of the complexity of variation within the genus as a whole. Underwood (1899) compared it to *P. pumila*, which is closely related. However, I believe that it may be closer yet to *P. nobilis* (Schlecht. & Cham.) Presl, which is not yet known from Chiapas but is to be expected. *Phanerophlebia lindenii* differs from *P. nobilis* solely in the fewer pairs of lateral pinnae. Since this is an extremely variable character in *Phanerophlebia*, this difference may not be significant.

Material I have seen of *P. haitiensis* is surprisingly like *P. lindenii*. Had the two been collected from the same area, there would be no question as to their conspecificity. Several other examples of this particular disjunct distribution are known, e.g., *Phyllitis lindenii*.

3. **Phanerophlebia macrosora** (Baker) Underw., Bull. Torrey Bot. Club 26:213. 1899.

—*Aspidium juglandifolium* (Humb. & Bonpl. ex Willd.) Kunze ex Klotzsch var. *macrosorum* Baker, J. Bot. 25:25. 1887. —*Cyrtomium macrosorum* (Baker) Morton, Amer. Fern J. 47:55. 1957. —TYPE: Costa Rica, *Cooper s.n.* (K! US).

Phanerophlebia guatemalensis Underw., Bull. Torrey Bot. Club 26:214. 1899. —TYPE: Guatemala, Dept. Quiché, San Miguel Uspantán, *Heyde and Lux s.n.* [ed. Donn.-Smith 3241] (NY; isotypes GH, P, US). First united under *P. macrosora* by Maxon (1912:26).

ILLUSTRATION: **Fig. 65.**

Rhizome stout; fronds (40) 85–135 cm long; stipe (25) 35–60 cm long, densely clothed with spreading, stramineous to light tan, ovate scales mostly 5–15 mm long, these glossy, fimbriate at margin; blade (15) 40–90 cm long, with (3) 6–17 pairs of lateral pinnae; rachis copiously scaly, scales lanceolate to capillary, deciduous, without buds; pinnae ± straight, (8) 15–25 cm long, 2–4 cm broad, narrowly oblong-lanceolate from a somewhat inequilateral base, upper base rounded to broadly cuneate, lower base excavate; pinna margins cartilaginous, entire to spinulose; veins free, 3–5-forked, lowest branch extending nearly to margin; leaf tissue and veins below with minute, narrowly lanceolate scales; sori 1–3 mm diam., with a subpersistent indusium; $n = 41$ (Oax.).

In Montane Rain Forest, Evergreen Cloud Forest; uncommon in s Sierra Madre, highest peaks of Central Plateau; (2100) 2400–3200 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *EM 4068* (MEXU, NY); *EM 5230* (MEXU, US); *EM 1893* (MEXU, US); *EM 4688* (MEXU); *T 1990* (DS); *GM 61* (DS); *15242*; *15299*; *26262*; *31881*; *41713*.

Matuda 4688 is very small, with only 3–4 pairs of pinnae, but has free veins and the stipe base scales of typical *P. macrosora*. It seems to be a precociously fertile specimen.

4. **Phanerophlebia pumila** (Mart. & Gal.) Fée, Gen. Fil. 282. 1852.

—*Aspidium pumilum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):64, pl. 17, fig. 1. 1842. —*Cyrtomium pumilum* (Mart. & Gal.) Morton, Amer. Fern J. 47:54. 1957. —TYPE: Mexico, Oaxaca, "Llano-Verde et del Carrizal," *Galeotti 6251* (BR! photo BM! UC!; isotype P!).

ILLUSTRATIONS: see original; also D. C. Eaton, Ferns N. Amer. 2:pl. 75, figs. 5–8. 1880 [as *Aspidium juglandifolium*]; Underwood (1899: pl. 359).

Rhizome short, erect, compact; fronds mostly 10–30 (45) cm long; stipe equaling or longer than blade, 1–2 mm diam., with rather dense, persistent, lanceolate to filiform scales toward base; blade coriaceous, 8–12 (25) cm long, with 0–3 (4) pairs of lateral pinnae; rachis with scattered, filiform scales, without buds; pinnae ovate, to ca. 8 (12) cm long, 2.5–3.5 (5.5) cm wide, the terminal the largest, subcordate at base, or lowermost pinnae inequilateral, excised basiscopically, subauriculate acroscopically; pinna margin spinulose throughout; veins free or only occasionally casually anastomosing; leaf tissue and veins below with scattered minute scales; sori 1–2 mm diam., in 1–2 (3) rows, inner row (1) 2–5 mm from costa, with subpersistent tan indusia; $n = 82$ (Chis.).

On rocks in Pine-Oak Forest; uncommon in Central Plateau, S Sierra Madre; 2300–2900 m. Southern Mex. (Oax., Ver.), Guat. CHIAPAS COLLECTIONS: *GM 74* (DS, US); *GM s.n.* (P); *G s.n.* (NY, US); *G 209* (BM, K, PH, YU); *Li 1552* (K, drawing NY); *Li s.n.* (P); *L&S 9922* (US), atypical in the lanceolate pinnae; *31816*, atypical in the sparsely spinulose pinna margins.

A variable species, with fronds sometimes simple but fully fertile. The persistent, filiform, rather dense stipe scales and free veins seem to be the best characters for distinguishing this species.

5. **Phanerophlebia remotispora** Fourn., Mex. Pl. 1:100. 1872.

—*Cyrtomium remotisporum* (Fourn.) Morton, Amer. Fern J. 47:54. 1957. —TYPE: Mexico, Veracruz, Izhuatlancillo, *Bourgeau 2349* (P; isotypes BM! K! P—3 sheets! US!).

ILLUSTRATIONS: Fée, Gen. Fil. pl. 22, B, fig. 1. 1852 [as *P. juglandifolia*]; Underwood (1899:pl 360).

Rhizome suberect; fronds mostly 60–125 cm long; stipe half to equaling blade length, 2–5 mm diam., with scattered, brownish, ovate to lanceolate scales at base; blade 35–65 cm long, with 5–13 pairs of lateral pinnae; rachis glabrescent or with scattered scales, without buds; pinnae straight to often falcate, mostly 10–16 cm long, 1.5–3.0 cm broad (terminal pinna about same size as lateral ones), cuneate to rounded at base, lanceolate, equilateral or lower pinnae inequilateral; pinna margin spinulose most of its length, decidedly so at pinna apex; veins anastomosing about two-thirds the way to pinna margin; leaf tissue and veins glabrous or usually with scattered, minute scales below; sori 1–2 mm diam., in 2–3 rows, inner row 2–5 mm from costa, indusiate, but indusia early-deciduous; $n = 41$ (Chis.).

On slopes and rocks in Montane Rain Forest, Pine-Oak-Liquidambar Forest; scattered in Central Plateau, Northern Highlands (Jitotol Ridge), N Sierra Madre; 1200–2200 m. Southern Mex. (Ver.), Guat.? CHIAPAS COLLECTIONS: *La 96, 549* (DS); *T&L 41308* (DS); *GM s.n.* (P); *7368, 10768; 21363; 22330; 31433; 32310; 32744; 34615.*

A substantial number of collections are intermediate between *P. remotispora* and *P. juglandifolia*: *G 414* (K, YU); *T&L 41784* (DS); *21652*; *21748*; *25355*; *25759*; *27697*; *29667*; *31320*; *33657*; *38770* [Central Plateau, Northern Highlands, Sierra Madre; Montane Rain Forest, Pine-Oak-Liquidambar Forest; Evergreen Cloud Forest; 1000–2300 m]. These collections have an intermediate number of pinna pairs (5–7), inner row of sori usually 1–2 mm from costa, anastomosing veins, indusiate or apparently exindusiate sori, large sori, pinna margins sparsely spinulose or spinulose only in distal third, and well-formed spores. I have seen similar collections from Salvador and Guatemala. To accommodate these specimens in either species would broaden their definition to the point that it would be impossible to recognize one as distinct from the other. Further cytological studies may provide an explanation for this variation: one specimen has already been counted as $n = 82$ (*31320*), suggesting that these intermediate specimens may have had an allopolyploid origin. *Phanerophlebia remotispora* is known as $n = 41$ from a single count, while no counts are available for *P. juglandifolia*.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Phanerophlebia nobilis (Schlecht. & Cham.) Presl —Jal., Mich., Méx., D.F., Pue., Oax. Closely related to *P. lindenii*, which see for discussion. Differing from *P. remotispora*, which it greatly resembles, by the free veins.

78. PHLEBODIUM

Phlebodium (R. Brown) J. Smith, J. Bot. (Hooker) 4:58. July 1841. —*Polypodium* L. sect. *Phlebodium* R. Brown *in* Horsfield, Pl. Jav. Rar. 4. 1838.

Plants epiphytic or on rocks; rhizome creeping, stout, dictyostelic, densely clothed with lanceolate, brown to golden, ciliate scales; stipe articulate to short phyllopodia; blade pinnatisect to a broad wing, with rounded sinuses; segments broad, entire, firm, chartaceous to coriaceous, usually glabrous, often glaucous; veins anastomosing, with a row of costal areoles without included veinlets, and then one to several rows of additional areoles, these with or without included veinlets; sori in one to several rows on both sides of costa, round, without paraphyses; sporangia glabrous; spores bilateral, strongly tuberculate, hyaline; $x = 37$.

The status of the genus name *Phlebodium* is in doubt; I continue to use the name in anticipation that it will be conserved. *Phlebodium* (R. Brown) J. Smith was a nomenclaturally superfluous name because J. Smith included *Pleopeltis* Humb. & Bonpl. ex Willd. (1810) as a section within his circumscription of the genus. Smith recognized four species in his sect. *Phlebodium* (including *P. aureum* and *P. decumanum,* the only two species mentioned by Brown), but failed to specify a definite type for *Phlebodium*. Thus, according to Art. 7, Note 4, of the International Code of Botanical Nomenclature, *Phlebodium* must be typified by *Pleopeltis angusta* Humb. & Bonpl. ex Willd., the type of *Pleopeltis*. *Phlebodium,* if it is to be used as a generic name, must then date from a subsequent work (one in which *Pleopeltis angusta* is excluded from the circumscription) and must also be conserved over *Phlebodium* (R. Brown) J. Smith. Alternatively, the type of *Phlebodium* must be conserved as either *Phlebodium aureum* or *P. decumanum*. *Chrysopteris* Link, with type *Polypodium aureum* L., was published in Sept. 1841 (Regnum Veg. 52:273. 1967) and so is not prior to *Phlebodium* as once thought (Webbia 9:431. 1953).

Depending on how many segregates of *Phlebodium aureum* are recognized, *Phlebodium* consists of two to several species, restricted to the Neotropics and subtropics, the distribution being that of *P. aureum*. According to Copeland (1947), *Phlebodium* is related to *Pleopeltis,* but the exact point of origin is obscure. It seems perhaps more likely to me that *Phlebodium* evolved from one of the goniophlebioid polypodiums, perhaps *Polypodium arcanum* Maxon or *P. eatonii* Baker.

Sori in one row on both sides of costa .... 1. *P. aureum*
Sori in two to several rows on both sides of costa .... 2. *P. decumanum*

1. **Phlebodium aureum** (L.) J. Smith, J. Bot. (Hooker) 4:59. 1841.

—*Polypodium aureum* L., Sp. Pl. 2:1087. 1753. —Type: LINN 1251.10 is this species and was present in LINN in 1753, according to Jackson (1912); Linnaeus cited Plumier and Petiver illustrations.
Polypodium leucatomas Poir. *in* Lam., Encycl. Méth. 5:516. 1804. —Type: French Guiana, *LeBlond s.n.* (P–LA).
Polypodium glaucinum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5): 32, pl. 5, fig. 1. 1842. —Type: Mexico, "El Sabino près Izmiquilpan" [specimen], *Galeotti 6430* (BR!).
Polypodium fulvum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):33, pl. 6. 1842. —Type: Mexico, Oaxaca, "environs de Villa-Alta," "Monte de Tanga" [specimen], *Galeotti 6463* (BR!; isotype BR!).
Illustrations: **Fig. 66**; also Knobloch & Correll, Ferns Chih. 138. 1962; Rovirosa, Pterid. Sur Mex. pl. 44. 1909; Vareschi, Fl. Venez. 1(2):pl. 200. 1969; Proctor, Fl. L. Antill. 2:327. 1977.

Rhizome 7–15 mm diam., densely scaly, often glaucous; rhizome scales ferruginous, narrowly lanceolate from a small, dark-centered base, denticulate to ciliate; fronds deciduous seasonally, arching or subpendent, 15–150 cm long; stipe (1) 2–6 mm diam., stramineous to usually castaneous, shining, shorter than blade, scaly at base, otherwise glabrous; blade deltoid to ovate, to 1 m long, (10) 15–50 cm broad, deeply pinnatifid, rachis usually glossy, stramineous to castaneous beneath; segments linear-oblong to lanceolate, 1–3 (5) cm broad, subequal or the upper ones gradually reduced (terminal one usually large, sometimes the largest), mostly oblique-spreading, entire, the double rachis wing 1–4 cm broad; leaf tissue greenish to glaucous below, glabrous or glabrescent; sori in 1 (rarely 2–3) rows on both sides of costa, inframedial; $n = 37$ (Jam.), 74 (Fla., P.R.).

Epiphytic in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest, Pine-Oak Forest; common in Northern Highlands, Central Plateau, Sierra Madre; 500–1700 m. Mexico (Chih. and S.L.P. to Chis.), Guat. to Pan.; S.A. (Col. to Sur. and Bol., Braz., and n Arg.); Fla., Antill. Chiapas Collections: *GM s.n.* (DS); *T&L 41197* (DS); *R 855* (PH); *G 311* (PH); *C&D 201* (US); *GM 84* (US); *14963*; *20255*; *21216*; *21600*; *21740*; *21879*; *22338*; *22354*; *22370*; *23320*; *28483*; *29104*; *31497*; *32095*; *32140*; *32456*; *32799*; *34601*; *42479*.

This species varies greatly in size and cutting, but no one has successfully interpreted this variation in terms of a meaningful classification. Hence, I apply the name in a broad sense.

2. **Phlebodium decumanum** (Willd.) J. Smith, J. Bot. (Hooker) 4:59. 1841.

—*Polypodium decumanum* Willd., L. Sp. Pl., ed. 4, 5:170. 1810. —Type: Brazil, *Hoffmannsegg s.n.* (B—Herb. Willd. 19640, 3 sheets, probably one frond).
Illustrations: Vareschi, Fl. Venez. 1(2):pl. 201. 1969; Proctor, Fl. L. Antill. 2:327. 1977.

Similar to *P. aureum,* but with 4–7 rows of sori on both sides of costa; venation more complex, with primary areoles formed by united veinlets from the ± straight, main lateral veins, secondary areoles formed within primary ones by the fusion of two excurrent veins, with sori located at point of fusion of excurrent veins.

Epiphytic, often on palms; rare in Gulf Coastal Plain; probably below 500 m. Southern Mex. (S.L.P., Ver., Tab.), Hond.; S.A. (Col. and Ven. to Bol., Parag., and s Braz.); Antill., Trin. Chiapas Collection: *R 54* (US).

Often treated as a synonym of *Polypodium leucatomas* Poir., but that name is a synonym of *Phlebodium aureum,* according to Morton (Contr. U.S. Natl. Herb. 38:63. 1967).

Species to Be Looked for in Chiapas

Polypodium araneosum Mart. & Gal. —Oax. [type from Villa-Alta, *Galeotti 6460* (BR! isotype BR!)]. Closely related to *P. aureum* but differing in the persistently scaly leaf tissue below.

79. PHYLLITIS

Phyllitis Ludwig, Inst. Hist. Phys. Regn. Veg., ed. 2, 142. 1757. —Type: *Asplenium scolopendrium* L. [=*Phyllitis scolopendrium* (L.) Newman]. See Pichi-Sermolli (Webbia 9:431–433. 1953) for another opinion.
Scolopendrium Adanson, Fam. des Pl. 2:20. 1763. —Type: *Scolopendrium vulgare* J. E. Smith [=*Asplenium scolopendrium* L.].

Plants terrestrial or epipetric; rhizome apex scales dark, clathrate; fronds simple or slightly lobed, linear-lanceolate, usually with a cordate to subcordate base; veins free, forking 1–3 times, running more or less parallel, ending in a clavate tip above; sori oblong to linear, arranged in pairs, each sorus of a pair with a linear indusium that opens toward other sorus of pair; $x = 36$.

Phyllitis is doubtfully distinct from *Asplenium,* and hybrids are known between species of the two genera, especially in Europe. I maintain it as distinct merely for convenience; also a new name would be required for the Mexican species because of the prior existence of *Asplenium lindenii* Hooker. Species of *Phyllitis* may be epiphytic, saxicolous, or terrestrial. Currently, five species are recognized, one in eastern North America and eastern Asia, three in Europe and the Mediterranean, and the very rare tropical American species.

Reference: Löve, A., and D. Löve. 1973. Cytotaxonomy of the boreal taxa of *Phyllitis*. Acta Bot. Acad. Sci. Hung. 19:201–206.

1. **Phyllitis lindenii** (Hook.) Maxon, Fernwort Papers 2:42. 1900.

—*Scolopendrium lindenii* Hook., Icon. Pl. 5:pl. 488. 1842. —Type: Mexico, Chiapas, "Chamulars" [Chamula], *Linden 1543* (K!).

Illustration: **Fig. 67.**

Rhizome erect, bearing numerous dark brown to blackish clathrate scales ca. 5 mm or more long; stipe brown to blackish, mostly 3–5 cm long, densely clothed with clathrate ferruginous scales ca. 3 mm long, these ending in a long tip, one cell wide; blade simple, to 25 cm long, 2–3 cm broad, acute at apex, subcordate at base, usually slightly broader in middle; leaf tissue with scattered, tan, linear scales below, especially when young; sori 0.3–1.0 cm long, indusia ca. 0.2–0.4 mm wide, entire; $n = 36$ (Chis.).

Rare, in caves, epiphytic on old oaks, in Central Depression?, Central Plateau; ca. 2200 m. Known only from s Mex. (Oax. and Chis.) and Haiti (Kongl. Svenska Vetenskapsakad. Handl. (3)16(2):50. 1937). Chiapas Collections: *G 307* (K, PH); *G 296* (K); *GM 80* (DS).

Christ (Fern Bull. 11:86–87. 1903) could not distinguish *P. lindenii* from the temperate species *P. scolopendrium* (L.) Newman. Admittedly, the two are very close; our species seems to be more abundantly scaly on the stipe and rachis, and the blades less prominently cordate at the base. Löve and Löve (1973) cited a cultivated collection [said to originate from La Concordia (Central Depression), Chiapas] at the Montreal Botanical Garden as the basis for a chromosome count of $2n = 72$. La Concordia is now under water. Correspondence with A. Löve indicates that no voucher was prepared and that the plant is no longer living. Eastern United States plants of *P. scolopendrium* (*P. japonica* Kom. according to Löve and Löve) are tetraploid.

Phyllitis lindenii requires a new name when treated in *Asplenium*.

80. PITYROGRAMMA

Pityrogramma Link, Handb. Gewächse 3:19. 1833. —Type: *Acrostichum chrysophyllum* Swartz [≡*Pityrogramma chrysophylla* (Swartz) Link].

Trismeria Fée, Gen. Fil. 164, pl. 14, figs. 1–2. 1852. —Lectotype (chosen by Maxon, Sci. Surv. Porto Rico 6:436. 1926): *T. aurea* Fée [≡*Pityrogramma trifoliata* (L.) Tryon].

For additional synonymy, see Lellinger (Mem. New York Bot. Gard. 23:7. 1972).

Plants terrestrial; rhizome erect, dictyostelic, bearing tan to brownish, lanceolate, concolorous scales; stipe glabrous or scaly only at base, polished, atropurpureous or brown, usually adaxially grooved; blade 1–3-pinnate, often lanceolate, chartaceous to subcoriaceous; segments usually with whitish to yellowish wax beneath; veins free; sporangia borne abaxially along veins, not in discrete sori, without indusia; paraphyses absent; spores globose-tetrahedral, dark, with equatorial ridges; $x = 30, 29$.

About twelve species in the New World, most of them widespread in the tropics and subtropics; at least four species extend into the Old World, especially Africa. A single, somewhat atypical species occurs in western United States. Most pityrogrammas are found in open habitats, often in disturbed sites such as roadbanks and ditches.

Reference: Tryon, R. 1962. Taxonomic fern notes. II. *Pityrogramma* (including *Trismeria*) and *Anogramma*. Contr. Gray Herb. 189:52–76.

a. Apical pinnae entire; lower pinnae entire to trifoliate, the segments linear-lanceolate .... 4. *P. trifoliata*
aa. Apical and lower pinnae with numerous, pinnately arranged lobes or segments.
  b. Ultimate segments obovate or oval; fronds small, 2-pinnate-pinnatifid to tripinnate .... 2. *P. dealbata*
  bb. Ultimate segments oblong, deltoid, lanceolate, or elliptical; small fronds pinnate-pinnatifid to 2-pinnate at base, large fronds to 3-pinnate.
    c. Pinnae equilateral; pinnules ascending, those on basiscopic side more strongly so than those on acroscopic side; scales of rhizome apex and stipe base with a long-conical terminal cell .... 1. *P. calomelanos* var. *calomelanos*
    cc. Pinnae inequilateral; pinnules on both sides of pinna at nearly right-angles to pinna-rachis (or in large leaves the tertiary segments so disposed on pinnule-rachis); scales of rhizome apex and stipe base with a spherical terminal cell .... 3. *P. tartarea* var. *tartarea*

1. **Pityrogramma calomelanos** (L.) Link, Handb. Gewächse 3:20. 1833.

—*Acrostichum calomelanos* L., Sp. Pl. 2:1072. 1753. —Type: according to Tryon (1962), LINN sheet 1245.19 is this species.

Ceropteris serrata Fée, Mém. Fam. Foug. 8:81. 1857. —Type: Mexico [Veracruz], Orizaba, *Schaffner 162* (P?). Listed by Tryon (1962) as perhaps *P. calomelanos* var. *calomelanos*.

For additional synonymy, see Tryon (1962).

Illustrations: Vareschi, Fl. Venez. 1(2):pl. 141. 1969; Small, Ferns SE States 95. 1938; Tryon, Contr. Gray Herb. 194:72, fig. 38. 1964; Proctor, Fl. L. Antill. 2:169. 1977.

Stipe base with relatively few, persistent, castaneous scales; blade 2-pinnate-pinnatifid to nearly 3-pinnate, lanceolate to ovate-lanceolate, in large fronds long-triangular; pinnae equilateral, distal ones strongly ascending; pinnules sessile to short-stalked, lanceolate, serrate or serrately incised or pinnatifid, ascending (those on basiscopic side more strongly ascending than those of acroscopic side); leaf tissue chartaceous, relatively thin, whitish or cream colored to pale yellowish below; *n* = ca. 120 (Jam.), 116 (Braz.).

Along roadbanks and ditches and other semidisturbed habitats adjacent to Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak Forest, coffee-cacao plantations; common, Gulf and Pacific coastal plains, Sierra Madre, Eastern and Northern highlands (not Jitotol Ridge); 150–1300 m. Mexico (Sin., Cma., Nay., Jal., Méx., S.L.P., Hgo., Ver., Mich., Gro., Oax., Tab.), Bel., Guat. to Pan.; S.A. (Col. to Fr. Gui. and Bol., Parag., Arg., Braz.); Fla., Antill.; widely introduced into Old World tropics. Chiapas Collections: *GM 13*, pt. (DS); *GM s.n.* (DS); *G 452* (PH); *C&D 96* (US); *R 198* (PH); *19930*; *20208*; *22232*; *22440*; *22547*; *22579*; *31581*; *33911*; *34229*; *34917*; *38569*; *40150*.

All Chiapas material is referable to Tryon's (1962) var. *calomelanos*. This species has never been found growing with *P. tartarea* in Chiapas. In fact, the two species overlap only slightly in their elevational ranges, *P. calomelanos* being found only at low elevations and *P. tartarea* occurring at middle and high elevations (above 1000 m).

2. **Pityrogramma dealbata** (Presl) Tryon, Contr. Gray Herb. 189:67. 1962.

—*Gymnogramma dealbata* Presl, Rel. Haenk. 1:18, pl. 3, fig. 1. 1825. —Lectotype (chosen by Tryon, 1962:67): Panama, *Haenke s.n.* (PR—sheet 24358a; photo GH).

Ceropteris schaffneri Fée, Mém. Fam. Foug. 8:80. 1857. —*Pityrogramma schaffneri* (Fée) Weatherby, Contr. Gray Herb. 114:25. 1936. —Syntypes: Mexico [Veracruz], "près d'Orizaba," *Schaffner 165a, 165b* (P?).

Illustration: **Fig. 6.**

Stipe base glabrescent to sparsely scaly; blade 2-pinnate-pinnatifid to 3-pinnate-pinnatifid, deltoid-lanceolate; lower pinnae ± equilateral, ascending; distal pinnae ascending; pinnules sessile to short-stalked, ultimate segments oblong and with oval or obovate, rounded lobes; leaf tissue chartaceous to subcoriaceous, with whitish to pale yellowish wax beneath.

On rocks in Pine-Oak Forest, Seasonal Evergreen Forest, Montane Rain Forest; uncommon in n Sierra Madre; 1000–1300 m. Southern Mex. (Cma., Jal., Mich., Oax., Ver.), Guat., Salv., Nic., C.R., Pan. Chiapas Collections: *S&M 3235* (MEXU, US); *H&S 19890* (US); *20648*; *40149*.

3. **Pityrogramma tartarea** (Cav.) Maxon, Contr. U.S. Natl. Herb. 17:173. 1913.

—*Acrostichum tartareum* Cav., Descr. Pl. 242. 1802. —Type: Peru, near Guamantanga, *Née* (MA; isotype P, photo US).

Pityrogramma tripinnata Domin, Spisy Přír. Fak. Karlovy Univ. 88:1–10. 1928. —Type: Mexico, *Parry & Palmer 1004* (K, photo GH, UC!; isotype US).

For additional synonymy, see Tryon (1962).

Illustrations: Vareschi, Fl. Venez. 1(2): pl. 141. 1969; Tryon, Contr. Gray Herb. 194:72, fig. 40. 1964.

Stipe base with rather dense, ± spreading, castaneous scales; blade pinnate-pinnatifid to 2-pinnate-pinnatifid, mostly lanceolate; pinnae inequilateral, more developed along basiscopic side, pinnules mostly spreading; distal pinnae nearly or quite at right angles to rachis; pinnules adnate to sessile; ultimate segments triangular to oblong, entire, ± rounded at apex, spreading at nearly a right angle to costule or costa; leaf tissue subcoriaceous, with whitish to cream-colored wax below, occasionally the wax very sparse; *n* = ca. 120 (Jam.).

Roadsides, edges of woods, and other semidisturbed habitats adjacent to Montane Rain Forest, Pine-Oak-Liquidambar Forest, infrequently Pine-Oak Forest, Evergreen Cloud Forest; common in Central Plateau, Northern Highlands (Jitotol Ridge), Sierra Madre; 1000–2800 m. Southern Mex. (Jal., Mich., Gro., Méx., Mlos., Hgo., Ver., Pue., Oax.), Guat., Salv., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Gr. Antill. Chiapas Collections: *GM 13*, pt. (DS); *GM s.n.*, pt. (DS); *GM 182* (DS, US); *R 1056* (PH); *EM 5398* (MEXU, US); *14160*; *15435*; *16142*; *19892*; *19950*; *21755*; *22677*; *23327*; *25495*; *31963*; *32371*; *33534*; *34622*.

Chiapas material is all referable to Tryon's (1962) var. *tartarea*. Morton and Lellinger (Amer. Fern J. 61:162. 1971) rejected the name *P. ebenea* (L.) Proctor for this species.

Ceropteris monosticha Fée (Mém. Fam. Foug. 7:44, pl. 22, fig. 2. 1857), type from near Orizaba (*Schaffner 155*) was listed as perhaps *P. tartarea* var. *tartarea* by Tryon (1962). From the illustration and description, it is more likely *Cheilanthes farinosa* (Forssk.) Kaulf. or perhaps a *Notholaena*.

4. **Pityrogramma trifoliata** (L.) Tryon, Contr. Gray Herb. 189:68. 1962.

—*Acrostichum trifoliatum* L., Sp. Pl. 2:1070. 1753. —*Trismeria trifoliata* (L.) Diels, Nat. Pflanzenf. 1(4):265. 1899. —Type: needs lectotypification; according to Tryon (1962), LINN 1245.9 and Sloane, Hist. Jam. pl. 45, fig. 2, are both this species; LINN 1245.10 is also this species. According to Jackson (1912), however, these collections were not present in LINN until after 1755.

Illustrations: Tryon (1962:63, fig. 3); Vareschi, Fl. Venez. 1(2):pl. 142. 1969; Plumier, Tract. Fil. Amer. pl. 144. 1705.

Stipe base to 1 cm diam., with persistent, ± appressed scales; blade linear-lanceolate, pinnate or with lower pinnae trifoliate (rarely to 5–7-foliate); distal pinnae entire, strongly ascending; pinnae lanceolate, entire to serrulate; leaf tissue chartaceous to subcoriaceous, with whitish to pale yellowish wax below; *n* = 58 (Jam.).

Wet roadbanks and ditches, adjacent to Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; locally common in Northern Highlands, n part of Central Plateau, s Sierra Madre; 900–1700 m. Mexico (Baja C.S., Méx., Ver., Oax.), Guat., Salv., Hond., Nic., C.R.; S.A. (Ven. and Col. to Bol., N Arg., Chile, Braz., Parag., Urug.); s Fla., Gr. Antill. CHIAPAS COLLECTIONS: *T 1407* (DS); *C 71* (DS); *GM 14* (DS, US); *EM 2762* (MEXU, US); *EM 17285* (MEXU); *X&S X-392* (US); *7602*; *14908*; *19927*; *21365*; *22191A*; *32462*; *33810*.

Tryon (1962) reported hybrids in South America between *P. trifoliata* and *P. calomelanos*, but no hybrids have been found in Chiapas.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Pityrogramma ferruginea (Kunze) Maxon —Guat. to Pan.; Peru. Distinguished from the other Chiapas species by the rachis and costae densely and persistently lanate.

Ceropteris plicata Fée (Mém. Fam. Foug. 8:81. 1857) —TYPE: Mexico [Veracruz], near Tolutla, *Schaffner 164*. Cited by Tryon (1962) as a probable synonym of one of the species of *Pityrogramma*. I have not seen type material.

81. PLAGIOGYRIA

Plagiogyria (Kunze) Mett., Abh. Senckenberg. Naturf. Ges. 2:265. 1858. —*Lomaria* sect. *Plagiogyria* Kunze, Farrnkr. 2:61. 1850. —TYPE: *Lomaria euphlebia* Kunze [≡*Plagiogyria euphlebia* (Kunze) Mett.].

Plants terrestrial; rhizome suberect, dictyostelic, without scales or hairs; young fronds covered with a gelatinous secretion; stipes fasciculate, their bases slightly expanded, blackish, subtriangular in cross section, bearing 2 rows of obscure to prominent glandlike protuberances (pneumatophores) at base; vascular bundles 3 at stipe base, fusing distally to a V- or U-shape; blades pinnatisect to pinnate, dimorphic, segments of fertile fronds greatly contracted; veins free, simple or 1-forked; leaf tissue chartaceous to subcoriaceous, glabrous; sporangia seemingly covering lower surface of fertile fronds at maturity; sporangial stalks of 4–6 rows of cells; annulus oblique, not interrupted by pedicel; spores tetrahedral, tuberculate to smooth; $x = 66$.

Lellinger (1971) recognized six very similar species in the New World; one of these (*P. semicordata*) is widespread, but all of the others are rather narrowly endemic (one species each in Mex. to Guat., Jam., Hisp., C.R. to Bol., and SE Brazil). The bulk of the species in the genus is in Japan to Malesia, China, and the Himalayan region. *Plagiogyria* seems to be without close relatives and is often regarded as representing a monotypic family. Several authors have suggested affinity with the Osmundaceae.

REFERENCE: LELLINGER, D. B. 1971. The American species of *Plagiogyria* sect. *Carinatae*. Amer. Fern J. 61:110–118.

Pinnae of sterile frond 5–7 (8) mm wide; veins simple and either solitary or paired at costae, or veins simple and 1-forked; margin of sterile pinnae simply serrate . . . . 1. *P. pectinata*
Pinnae of sterile frond (7) 8–12 mm wide; veins solitary and 1-forked or paired at costae and 0–2-forked; margin of sterile pinnae usually biserrate, at least toward apex . . . . 2. *P. semicordata*

1. **Plagiogyria pectinata** (Liebm.) Lellinger, Amer. Fern J. 61:115. 1971.

—*Lomaria pectinata* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:233. 1849. —TYPE: Mexico, Oaxaca, "Cerro de Sempoaltepec," *Liebmann* [Liebm. Pl. Mex. 2477, Fl. Mex. 268] (C!).

Lomaria arguta Fée, Mém. Fam. Foug. 8:70. 1857. —*Plagiogyria arguta* (Fée) Copel. Philipp. J. Sci. 38:407, pl. 8. 1929. —TYPE: Mexico [Veracruz], "vallée d'Orizaba, Cerro del Agua," *Schaffner 98* (P?).

Plagiogyria aequidentata Fourn., Mex. Pl. 1:133. 1872. —TYPE: Mexico, Veracruz, Orizaba, *Müller 723* (Hb. Lenormand).

ILLUSTRATIONS: **Fig. 68**; Knobloch & Correll, Ferns Chih. 132. 1962 (as *P. semicordata*); Stolze, Fieldiana, Bot. 39:92, fig. 14d. 1976.

Fronds to ca. 1 m long, the fertile somewhat longer than the sterile; blade pinnatisect to fully pinnate at base; pinnae adnate, dilate at base, 5–7 (8) mm broad, margins simply serrate; lowermost several pairs of pinnae reduced $^{1}/_{10}$–$^{1}/_{2}$ length of longest pinnae (to ca. 1 cm long); veins simple and either solitary or paired at costa, or veins simple and 1-forked.

Bogs and forest understory in Evergreen Cloud Forest; uncommon in Central Plateau; 2200–2700 m. Mexico (Chih., Dgo., Jal., Hgo., Pue., Mlos., Méx., Oax.), Guat. CHIAPAS COLLECTIONS: *GM s.n.* (DS, US); *GM 102* (DS, US); *12565*; *12907*; *32034*.

2. **Plagiogyria semicordata** (Presl) Christ, Farnkr. 176. 1897.

—*Lomaridium semicordatum* Presl, Epim. Bot. 155. 1849 [1851]. —TYPE: Colombia, collector not stated (presumably PR or PRC).

Plagiogyria biserrata Mett., Abh. Senckenberg. Naturf. Ges. 2:272, pl. 15, figs. 1–18. 1858. —LECTOTYPE (chosen by Copeland, Philipp. J. Sci. 38:409. 1929): Venezuela, Colonia Tovar, *Moritz 400* (B; isolectotype HBG).

ILLUSTRATIONS: see under synonym cited above; also Stolze, Fieldiana, Bot. 39:92, fig. 14, a–c. 1976.

Similar to *P. pectinata* but differing by the pinnae (7) 8–12 mm wide, margin biserrate; veins solitary and 1-forked or paired at costa and 0–2-forked; $n = 66$ (Jam.).

In Evergreen Cloud Forest; uncommon in Central Plateau; 2700 m. Southern Mex. (Ver., Oax.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol.); Cuba, Jam. CHIAPAS COLLECTIONS: *L&S 9947* (US); *G 395* (YU); *21995*.

It is highly questionable whether two species of *Plagiogyria* occur in Mexico and northern Central America. The three characters used by Lellinger (1971) to separate *P. semicordata* and *P. pectinata* seem to be related: pinna-margin serration is a function of amount of vein forking, which in turn is a function of pinna size (width). Frond (pinna) size is often quite variable in ferns and by itself is generally insufficient to distinguish two closely related species. Most specimens of *Plagiogyria* from Oaxaca, Chiapas, and Guatemala have a series of greatly reduced pinnae at the blade base (Lellinger, 1971), so this character is also insufficient to separate the two species.

82. PLECOSORUS

Plecosorus Fée, Gen. Fil. 150, pl. 13A. 1852. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 169. 1875): *Cheilanthes speciosissimus* Kunze [≡*Plecosorus speciosissimus* (Kunze) Moore].

Plants terrestrial; rhizome short, ascending, scaly; stipes clustered, scaly, with numerous vascular bundles arranged in a ring; ultimate divisions of blade oblong or round, not mucronate, strongly inrolled, margin scarious; veins free; sori dorsal on veins, round; indusia absent; spores bilateral, with a winged perispore.

As usually construed, a monotypic genus that could be included within *Polystichum*. The combination of exindusiate sori, strongly revolute leaf margin, and nonmucronate segments distinguish *Plecosorus* from *Polystichum*.

1. **Plecosorus speciosissimus** (Kunze) Moore, Ind. Fil. 195. 1857.

—*Cheilanthes speciosissima* A. Br. ex Kunze, Anal. Pterid. 35, pl. 23. 1837. —*Plecosorus mexicanus* Fée, Gen. Fil. 151, pl. 13A. 1852 (nom. superfl.). —*Polystichum speciosissimum* (Kunze) Copel., Gen. Fil. 109. 1947. —TYPE: "E regno mexicano retulit *de Karwinski*" (LZ, destroyed).

ILLUSTRATIONS: **Fig. 69**; see under *P. mexicana*, above.

Rhizome stout, erect, densely scaly, scales ferruginous, shining, linear-lanceolate to ovate-lanceolate, to 4 cm long, 5 mm wide, entire to minutely denticulate to irregularly toothed on margin, often completely concealing stipe bases and rhizome apex; stipe to 28 cm long, 7 mm diam., densely scaly, especially at base, scales similar to those of rhizome; rachis densely scaly, scales smaller than those of stipe base; blade coriaceous, to 75 cm long, several times longer than stipe, to 25 cm broad, bipinnate-pinnatifid to barely tripinnate-pinnatifid (juvenile fronds pinnate-pinnatifid), lowermost several pairs of pinnae usually somewhat reduced; pinnae sessile, to 40 pairs, frequently overlapping, to 2.5 cm broad, widest at or near their base; ultimate segments oblong to round, with a strongly inrolled, membranous, whitish margin, sometimes appearing beadlike; costae below densely covered with linear to linear-lanceolate scales, above with scattered scales, surface of lamina between veins glabrous; sori superficial, round, exindusiate, often confluent with age, more or less concealed by the inrolled margin and dense scales on the midrib.

Steep slopes with *Pinus, Juniperus,* and *Buddleia* on Volcán Tacaná; s Sierra Madre; 2000–3600 m. Southern Mex. (Jal., Mich., Méx., D.F., Mlos., Ver., Gro., Pue., Oax.), Guat., Pan.; Col.? CHIAPAS COLLECTIONS: *EM 2318* (F, MEXU, MICH, US); *R 1082* (cited by Rovirosa, Pterid. Sur Mex. 127. 1909; not seen, identification suspect); *24302*.

83. PLEOPELTIS

Pleopeltis Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:211. 1810. —TYPE: *Pleopeltis angusta* Humb. & Bonpl. ex Willd.

Plants epiphytic; rhizome elongate, creeping, dictyostelic, scaly; fronds articulate to rhizome, simple to pinnatifid, firm to coriaceous, bearing peltate to ovate-lanceolate scales; veins anastomosing freely and irregularly with included veinlets; sori borne at union of several veinlets, round to oblong to elongate, covered initially by peltate paraphyses; sporangial stalk of three rows of cells; spores bilateral, hyaline to yellowish, translucent, smooth or nearly so, without perispore; $x = 37$ (New World species).

If one includes *Lepisorus,* an Asiatic genus, within its circumscription, *Pleopeltis* consists of about 40 species. About 12 of these are New World, most occurring in Mexico. One species, *P. macrocarpa,* is amphioceanic, occurring in the Neotropics, Africa, and India.

The relationships of *Pleopeltis* are problematic. On the one hand, certain species seem close to scaly species of *Microgramma,* a Neotropical polypodioid genus also with simple blades. On the other hand, there are resemblances to some species of *Polypodium* s.s., especially those with united veins and scaly leaf tissue. There is evidence that one "species," *Polypodium leucosporum* Klotzsch, originated as a hybrid between *Pleopeltis macrocarpa* and *Polypodium thyssanolepis* (Wagner and Wagner, Brit. Fern Gaz. 11:125–135. 1975), and Weatherby (Amer. Fern J. 25:52–59. 1935) described *Polypodium bartlettii* Weatherby as a possible hybrid between *Polypodium polypodioides* (L.) Watt and *Pleopeltis polylepis* (Roem. ex Kunze) Moore. In addition, it is possible that *Pleopeltis* as currently construed is unnatural (see discussion under *Pleopeltis percussa*).

REFERENCE: WEATHERBY, C. A. 1922. The group of *Polypodium lanceolatum* in North America. Contr. Gray Herb. 65: 3–14.

a. Fronds pinnatisect.
  b. Segments of fertile fronds greater than 1 cm wide; segments less than 10 times as long as wide, rounded to acute at tip; rhizome ca. 3–4 mm diam., often white-waxy beneath scales .... 4. *P. munchii*
  bb. Segments of fertile fronds mostly less than 1 cm wide, often ca. 0.5 cm wide; segments mostly 10–20 times longer than wide, lanceolate at tip; rhizome thin, ca. 2 mm diam., not white-waxy .... 1. *P. angusta*
aa. Fronds simple, unlobed.
  c. Sori elongate; blades tapering nearly or quite to rhizome; scales of lamina fringed .... 6. *P. revoluta*

cc. Sori round to slightly oblong; stipe to 3 (10) cm long; scales of lamina entire or slightly fringed.
  d. Sori with numerous filiform paraphyses, these often nearly obscuring sporangia; midrib stramineous; sori well back from margin; blade with attenuate-caudate apex .... 5. *P. percussa*
  dd. Sori with peltate paraphyses, these usually lost at maturity; midrib blackish; sori supramedial or sometimes overlapping blade margin; blade acute at apex.
    e. Rhizome scales tan, mostly concolorous or with a narrow black central stripe, not or only sparingly comose; at least some of veins beneath, especially those nearest midrib and base of blade, darkened and thickened; sori not overlapping blade margin, to ca. 3 mm diam.; 700–1600 m .... 2. *P. crassinervata*
    ee. Rhizome scales bicolorous, with tan margins and a broad blackish central stripe, densely to sparingly comose; veins beneath (except for midrib) not visible, neither darkened nor thickened; sori larger, mostly 3–6 mm long, 3–5 mm broad, sometimes overlapping blade margin at maturity .... 3. *P. macrocarpa*

1. **Pleopeltis angusta** Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:211. 1810.

—*Polypodium angustum* (Humb. & Bonpl. ex Willd.) Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:186. 1849. —TYPE: Mexico, *Humboldt & Bonpland s.n.* (B—Herb. Willd. 19729).

Drynaria torulosa Fée, Gen. Fil. 271. 1852. —TYPE: "Cuba," *Linden s.n.* (presumably P). Locality probably in error; more likely collected in Chiapas by *Linden*.

Drynaria stenoloma Fée, Gen. Fil. 272. 1852. —TYPE: Mexico, Talea, *Galeotti 6532* (presumably P).

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 47. 1909; Fée, Mém. Fam. Foug. 6: pl. 4, fig. 4, pl. 5, fig. 4. 1854; Kunth, Nov. Gen. et Sp. pl. 1. 1815.

Rhizome long-creeping, 1–2.5 mm diam., without wax, with dense, blackish (but with a very narrow, tan, marginal row of cells), lanceolate, ascending, subentire to denticulate-margined scales, these often nearly obscured by tufts of brown hairs from base of scales; fronds subdimorphic, (6) 12–35 cm long (the fertile longest), with dark brown to blackish, ± glabrous stipes, these ⅔ to 1.5 times blade length; blade pinnatisect with (1) 2–4 pairs of lateral segments and a confluent terminal segment, these all about the same size; segments linear-lanceolate, mostly 5–12 cm long, 2–8 (13) mm broad in their middle (the fertile narrower than the sterile), acute at tip, long-decurrent at base, separated by very wide squarrose sinuses to ca. 5 times broader than segment width; midribs blackish; leaf tissue chartaceous to subcoriaceous, below with scattered peltate scales, these blackish to dark brown at center, tan and irregularly denticulate at margin; sori round to often oblong, to 4 mm long, frequently overlapping segment margin at maturity; $n = 37$ (Oax., Guat.), 34 (Guat.).

Epiphytic in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, rarely Evergreen Cloud Forest; common in Northern and Eastern highlands, Central Plateau, Sierra Madre; 700–2200 (2700) m. Southern Mex. (Cma., Jal., Mich., Gro., Oax., Ver.), Guat., Salv., Nic. CHIAPAS COLLECTIONS: *R 842* (PH); *G 280* (K); *GM 142* (DS); *P 6756* (NY, UC, US); *EM 5083* (MEXU, UC, US); *EM 192* (MEXU, NY, US); *EM 5423* (MEXU, US); *Dr 1644* (MEXU); *T&L 41352* (DS); *20280*; *21705*; *22358*; *22462*; *22656*; *23324*; *25715*; *26348*; *29131-A*; *29286*; *31501*; *31679*; *32315*; *32489*; *32935*; *38982*; *40702*.

Brazilian material referred to *P. angusta* belongs to the related *P. pleopeltifolia* (Raddi) Alston.

2. **Pleopeltis crassinervata** (Fée) Moore, Ind. Fil. 345. 1862.

—*Drynaria crassinervata* Fée, Mém. Fam. Foug. 8:97. 1857. —*Polypodium crassinervatum* (Fée) Kiaersk., Cat. Fil. Herb. Ht. Haun. 49. 1874. —*Polypodium lanceolatum* L. var. *crassinervatum* (Fée) Weatherby, Contr. Gray Herb. 65: 8. 1922. —SYNTYPES: Mexico. Veracruz. "vallée d'Orizaba," *Schaffner 173, 489*; Cordoba, *Schaffner 174a* (not found at P or K).

ILLUSTRATION: **Fig. 70.**

Similar to *P. macrocarpa*, but rhizome scales tan (except at point of attachment), mostly concolorous or a few with narrow black central stripes, not or only sparingly comose; blade relatively small, narrower, mostly 5–16 (20) cm long, 3–14 mm broad; blade margin entire, often revolute; at least some of veins beneath, especially those nearest midrib and base of blade, darkened and thickened; scales fewer and lighter colored on leaf tissue below; sori not overlapping blade margin, to ca. 3 mm diam.

Epiphytic in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; relatively common in Northern Highlands, Sierra Madre, N Central Plateau; 700–1600 m. Southern Mex. (Oax., Ver.), Guat. CHIAPAS COLLECTIONS: *C&D 224* (US, not seen); *T&L 41122* (DS); *20285*; *21617*; *21878*; *22502*; *24909*; *24993*; *25503*; *27613*; *29131*; *30883*; *31259*; *31528*; *32313*; *32505*; *32885*.

In general, *P. crassinervata* grows at lower elevations than *P. macrocarpa*, and the two probably seldom grow together.

3. **Pleopeltis macrocarpa** (Bory ex Willd.) Kaulf., Berlin. Jahrb. Pharm. Verbundenen Wiss. 21:41. 1820.

—*Polypodium macrocarpum* Bory ex Willd., L. Sp. Pl., ed. 4, 5:147. 1810. —TYPE: Mascarenes, Réunion, *Bory s.n.* (B—Herb. Willd. 19629; isotype P).

Polypodium lanceolatum L., Sp. Pl. 2:1082. 1753. —*Pleopeltis lanceolata* (L.) Presl, Tent. Pterid. 193. 1836 (not Kaulf., 1824). —TYPE: Petiver's Pteri-graphia Amer. pl. 6, fig. 2, 1712, which is a redrawing of Plumier's Tract. Fil. Amer. pl. 137, 1705.

For additional synonymy, see Weatherby (1922) and Pichi Sermolli (Webbia 20: 349–354. 1965).

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 192, 193. 1969.

Rhizome long-creeping, 1–2 mm diam., without wax, scales bicolorous with tan margins and a blackish central stripe, ovate to lanceolate, ascending to subpatent, entire to denticulate to erose at margin; fronds mostly (10) 15–35 (40) cm long, with brown to blackish stipes mostly 1–4 (10) cm long; blade simple, entire- to sinuate-margined, mostly 1–3.5 cm broad, narrowed gradually on both sides of middle; midrib blackish; veins not darkened nor easily visible; leaf tissue coriaceous, with dark peltate scales below, these ± entire-margined or faintly fringed; blade glabrous adaxially; sori round to often slightly oblong, mostly 3–6 mm long, 3–5 mm broad, sometimes overlapping margin at maturity; $n = 74$, ca. 74 II + 37 I (Jam.); $n = 70$ (C.R.); $2n = 210$ (Gal.).

A polymorphic species, ranging from southern Mexico through Central and South America (Col. and Ven.

to Bol., Braz., N Arg., Urug., Gal., J. Fernán.); Jam., Cuba, Hisp.; trop. and s Africa, Madag., Ceylon, and India. Chromosome counts from several Neotropical localities indicate that *P. macrocarpa* is cytologically complex. Weatherby (1922) recognized four American varieties, one of which I have elevated to species rank. Below, I include another variety, var. *interjecta*, which Weatherby treated as a variety of another species. I am uncertain as to the relationship of the type variety, var. *macrocarpa*, to the two varieties that I recognize from Mexico. It seems close to var. *trichophora*, but the rhizome scales are not so comose. No one has yet attempted to review systematically both Old and New World variants of *P. macrocarpa*, and until such a time, infraspecific names can be applied only with uncertainty. The following key will distinguish the two Mexican varieties that I recognize:

Rhizome scales with conspicuous hairs, the rhizome often appearing tomentose; scales on lower surface of blade erose to ± entire, scattered to few and often inconspicuous; blade to 40 cm long, 3.5 cm broad; rhizome scales ovate to ovate-lanceolate, erose or denticulate on margin, with a very broad, blackish center, ascending to subpatent; 1200–2800 m .... 3b. var. *trichophora*

Rhizome scales without conspicuous hairs; scales on lower surface of blade ± entire, numerous and conspicuous; blade 7–23 cm long, 0.7–1.5 (1.8) cm broad; rhizome scales lanceolate, ± entire, with a narrow blackish central stripe, strongly appressed-ascending; 2300–2800 m .... 3a. var. *interjecta*

3a. **Pleopeltis macrocarpa** var. **interjecta** (Weatherby) A. R. Smith, Amer. Fern J. 70:26. 1980.

—*Polypodium peltatum* Cav. var. *interjectum* Weatherby, Amer. Fern J. 34:17. 1944. —Type: Guatemala, Chimaltenango, Cerro de Tecpam near Santa Elena, 2700 m, *Standley 60957* (F).

Illustration: none found.

Epiphytic or occasionally on rocks in Oak Forest and Evergreen Cloud Forest; locally common in Central Plateau, especially Cerro Huitepec; 2300–2800 m. Otherwise known only from Guat. Chiapas Collections: *C&D 135* (GH, not seen); *L&S 9829* (DS, US); *GM 82* (DS, US); *La 164* (DS); *G 266* (K, NY, PH); *8128*; *15094*; *22092*; *23014*; *25297*; *27223*; *32065*.

As Weatherby stated, var. *interjecta* is closely related to var. *trichophora* and var. *macrocarpa* (Weatherby's var. *lanceolata*) on the one hand and *Pleopeltis polylepis* (=*Polypodium peltatum* Cav., according to Christensen, Dansk. Bot. Ark. 9(3):11. 1937) on the other hand. It is quite possible that var. *interjecta* is an evolutionary link to *P. polylepis* from *P. macrocarpa*. My reason for placing it with the latter is that I find that scale size and number (large and numerous in *P. polylepis*, small and sparse in *P. macrocarpa* including var. *interjecta*) on the abaxial surface of the blade are more consistent than characters of scale margin (entire in *P. polylepis* and entire to erose to denticulate in *P. macrocarpa*). Weatherby used characters of the scale margin to distinguish between *P. macrocarpa* and *P. polylepis*.

In Chiapas, var. *interjecta* is readily distinguishable from var. *trichophora* by the characters mentioned in the key, and I would have no serious objection to treating it as a distinct species. Still, its origin from and relationship to var. *trichophora* are obvious, so it can be kept here for convenience.

3b. **Pleopeltis macrocarpa** var. **trichophora** (Weatherby) Pic. Ser., Webbia 23:189. 1968.

—*Polypodium lanceolatum* L. var. *trichophorum* Weatherby, Contr. Gray Herb. 65:8. 1922. —Type: Mexico, Edo. México, near Eslaba, *Pringle 11797* (GH; isotype US).

Drynaria mexicana Fée, Mém. Fam. Foug. 8:97. 1857. —Syntypes: Mexico. Veracruz, *Galeotti 6321*; Puebla, *Schaffner 179*; Popocatepetl, *Schaffner 292* (presumably P).

Illustration: none found.

Epiphytic or on rocks, in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak and Pine-Oak-Liquidambar forests; common in Central Plateau, Northern Highlands (Jitotol Ridge), Sierra Madre; (1200) 1500–2800 m. Southern Mex. (Sin., Jal., Mich., Mlos., Méx., S.L.P., Hgo., Ver., Oax., Pue.); Guat., Salv. Chiapas Collections: *Li 1542* (K); *C&D 200* (US); *JTM 1217* (US); *A 1253* (DS, UC); *R&B 19980* (DS, US); *T&L 41469*, *41484* (DS); *C 316* (DS); *15308*; *21402*; *22005*; *22359*; *23112*; *23156*; *23325*; *25015*; *26850*; *27678*; *27741*; *29201*; *30068*; *31422*; *31935*; *32141*; *32351*; *33520*; *34602*; *40389*; *41037*; *41357*.

4. **Pleopeltis munchii** (Christ) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:230. 1975.

—*Polypodium munchii* Christ, Bull. Herb. Boissier (2)3:147. 1903. —*Microgramma munchii* (Christ) Copel., Amer. Fern J. 43:15, pl. 2. 1953. —Type: Mexico, Chiapas, San Cristóbal Las Casas, *Münch 90* (not found at P; isotypes DS!).

Illustration: see under synonym above.

Rhizome long-creeping, 2.5–4.0 mm diam., often white-waxy beneath the dense, tan to ferruginous, ovate, ascending, erose-margined to subentire, ± concolorous scales; fronds 8–35 cm long, with tan to usually dark brown or nearly blackish, sparsely scaly stipes, these two-thirds to equaling blade length; blade pinnatifidly 3–5 (7)-lobate, all lobes about the same size, 3.5–12 cm long, (0.7) 1.0–1.5 (2.0) cm broad, rounded to acutish at tip, cuneate or at least slightly narrowed at base, decurrent, upper lobes connected to lower ones by a very narrow wing; leaf tissue coriaceous, below with scattered peltate or weakly peltate-ovate appressed scales, these with a brown center, tan ± entire margin, a few similar scales on leaf tissue above; sori round, large, 3–5 mm diam. at maturity, not extending beyond blade margin.

Epiphytic in Oak Forest, Evergreen Cloud Forest; uncommon on higher peaks of Central Plateau, s Sierra Madre; 2600–3000 m. Southern Mex. (Oax.), Guat., Salv., Nic.? Chiapas Collections: *GM 90* (DS); *GM s.n.* (P); *G 272* (YU); *La 162*, *1862* (DS); *JTM 1229*, *1248* (US); *6692*; *7811*; *22034*; *22059*; *22753*; *31763*; *32060*; *40332*.

This species was placed in *Microgramma* by Copeland, but its habitat is decidedly not that of Microgrammas, which grow at low elevation. In morphology, it seems most similar to *Pleopeltis angusta*, the type of *Pleopeltis*, and I have recently transferred it to that genus. However, the rhizome scales of these two species are very different.

5. **Pleopeltis percussa** (Cav.) Hook. & Grev., Icon. Fil. 1:pl. 67. 1828.

—*Polypodium percussum* Cav., Descr. Pl. 243. 1802. — Type: Peru [incorrectly stated as Mariannes by Cav.], *Née s.n.* (MA, seen and commented upon by Christensen, Dansk. Bot. Ark. 9(3):11, 1937).

Illustrations: see under accepted name above; Vareschi, Fl. Venez. 1(2):pl. 192. 1969; Langsdorff & Fischer, Icon. Fil. pl. 6. 1810.

Rhizome long-creeping, 1–2 mm diam., bearing tan, lanceolate, ± ascending to patent, entire-margined, concolorous (except darker at point of attachment) scales; fronds mostly 15–25 (40) cm long, with tan, scaly stipes less than 3 cm long; blade simple, narrowly elliptic, mostly 1–3 cm broad with an abruptly acuminate and sometimes caudate apex, cuneate at base; midrib stramineous; leaf tissue chartaceous to subcoriaceous, on both sides with numerous peltate scales (a few peltate-ovate), these with a small dark center, otherwise whitish, short-fimbriate at margin; sori 2–3 mm diam., with dense filiform paraphyses nearly obscuring sporangia, paraphyses whitish tan when young, reddish brown when mature; $n = 37$ (C.R., Peru).

Epiphytic or occasionally on rocks in Tropical, Lower Montane, and Montane rain forests (sometimes disturbed); scattered in Eastern and Northern highlands (not Jitotol Ridge), Gulf Coastal Plain; 150–800 m. Southern Mex. (Chis. only), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol., Braz.). Chiapas Collections: *Dr 1594* (MEXU, US); *G 279* (K); *C&D 238* (US); *M&M 901* (WIS); *26444*; *29899*; *32915*; *34518*; *35034*; *35371*; *41986*.

In several respects, this is not a typical *Pleopeltis*, e.g., it has dense, filiform paraphyses in the sori and a stramineous (rather than blackened) midrib. It seems to me that it might be closer to *Microgramma*, but its placement there should await a thorough study of the limits of these two genera.

6. **Pleopeltis revoluta** (Spreng. ex Willd.) A. R. Smith, Proc. Calif. Acad. Sci. (4)40:230. 1975.

—*Grammitis revoluta* Spreng. ex Willd., L. Sp. Pl., ed. 4, 5:139. 1810. —Type: not stated, received from Sprengel (B—Herb. Willd. 19584).

Grammitis elongata Swartz, Syn. Fil. 22, 213. 1806 (not *Polypodium elongatum* Ait., 1879, nor of Schrader, 1818, nor *Pleopeltis elongata* Kaulf., 1824). —*Gymnogramma elongata* (Swartz) Hook., Sp. Fil. 5:157. 1864. —*Polypodium lanceolatum* L. var. *elongatum* (Swartz) Krug, Bot. Jahrb. Syst. 24:131. 1897. —Type: original publication not seen.

Polypodium astrolepis Leibm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:185. 1849. —*Pleopeltis astrolepis* (Liebm.) Fourn., Mex. Pl. 1:87. 1872. —Syntypes: Mexico. Veracruz, Mirador, Aug. 1841, *Liebmann*; Oaxaca, Trapiche de la Concepción, *Liebmann* (C!; fragm. GH). Both specimens are mounted on the same sheet [Fl. Mex. 87], and there is no way to determine which specimen belongs with which label; both are *Pleopeltis revoluta*. I designate the lowermost specimen as lectotype.

For additional synonymy, see Weatherby (1922).

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 50, figs. 1–3. 1909; Schkuhr, Kr. Gew. 1:pl. 7. 1810 [as *Grammitis lanceolata*].

Rhizome long- to short-creeping, (0.5) 1.0–1.5 mm diam., without wax, with dense, small (ca. 1 mm long), blackish, peltate to ovate-peltate scales that are obscured by brown hairs (scales densely comose); fronds subdimorphic (the sterile broader and shorter than the fertile), mostly 3–12 (22) cm long, without stipes or very short-stiped; blade simple, 4–10 (20) mm broad, entire, tapering gradually on both sides of middle to an acute apex, below tapering nearly or quite to the rhizome; midrib blackish; veins not easily visible; leaf tissue below with scattered tan (brown center) peltate to peltate-ovate scales, these with a fringed margin (scales lacerate-stellate); sori oblong to usually elongate (especially on young fronds), to 6 (10) mm long, 1–2 mm broad, not overlapping margin; $n = 74$ (P.R.).

Epiphytic or on rocks in Tropical and Lower Montane rain forests, Seasonal Evergreen Forest, rarely Montane Rain Forest, Pine-Oak Forest; common in Eastern and Northern highlands (not Jitotol Ridge), n Central Plateau, Central Depression, s Pacific Coastal Plain; 200–1000 (1200) m. Southern Mex. (Cma., Gro., Oax., Ver., Yuc.), Bel., Guat., Salv., Nic., C.R.; S.A. (Sur., Fr. Gui., Braz.); Antill., Trin. Chiapas Collections: *R 58* (PH, US); *R 863* (PH); *G 446* (BM, NY); *P 6759* (UC, US); *EM 17546* (MEXU, UC); *Dr 1596* (MEXU); *EM 18023* (MEXU, US); *6454*; *6590*; *22166*; *22253*; *22434*; *26538*; *26998*; *27539*; *28573*; *29783*; *32820*; *33954*; *37684*; *38193*; *40049*.

Pleopeltis revoluta has often been cited as growing on *Crescentia* (Rovirosa, Pterid. Sur Mex. 239. 1909; Splitgerber, Tijdschr. Natuurl. Gesch. Physiol. 7:398. 1840) or *Theobroma* (herbarium specimens).

Species to Be Looked for in Chiapas

The following two species of *Pleopeltis* are very restricted Mexican endemics and perhaps do not occur in Chiapas.

Polypodium conzattii Weatherby —known only from a few localities in Oax. Distinguished from *Pleopeltis macrocarpa* by the numerous, overlapping scales on the lower surface of the blade, most of the scales being ovate-lanceolate rather than orbicular.

Polypodium sordidulum Maxon & Weatherby —known only from a few localities in the vicinity of Cordoba, Ver. Distinguished by its very small fronds and lobed blades (Amer. Fern J. 17:91, pl. 5. 1927).

84. POLYBOTRYA

Polybotrya Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:99. 1810. —Type: *Polybotrya osmundacea* Humb. & Bonpl. ex Willd.

Plants terrestrial or often vinelike (hemiepiphytes); rhizome long-creeping, often ca. 1 cm thick, densely scaly; fronds dimorphic, the sterile pinnate to tripinnate; veins free to anastomosing; leaf tissue glabrous to pubescent, often subcoriaceous to coriaceous; axes grooved above, grooves running into one another; fertile fronds greatly contracted, segments often 2–3 mm wide, not foliaceous, 2–3-pinnate, sporangia covering the surface (acrostichoid); indusia absent; spores bilateral with a thick perispore; $x = 41$.

About 25 species in the Neotropics, with most species confined to southern Central America and South America. All three species occurring in Chiapas are uncommon or rare, at relatively low elevations, in dense rain forests.

a. Veins of sterile fronds parallel, free (except for marginal commissure); pinnae entire .... 3. *P. cervina*
aa. Veins of sterile fronds pinnate, not parallel, anastomosing or free; pinnae serrate to pinnate-pinnatifid.
b. Pinnae serrate to crenately lobed; veins anastomosing .... 1. *P. aucuparia*
bb. Pinnae pinnate-pinnatifid; veins free or those of ultimate segments running to sinus .... 2. *P. caudata*

1. **Polybotrya aucuparia** Christ, Bull. Herb. Boissier (2)6:166. 1906.

—Type: Costa Rica, valle del Río Navarro, 1400 m, *Wercklé s.n.* [Herb. Inst. Costar. *16670*] (P, photo UC!).
Illustrations: **Fig. 71**; Rovirosa, Pterid. Sur Mex. pl. 60. 1909 [as *Acrostichum coenopteris*].

Rhizome densely clothed with subulate, castaneous scales to ca. 15 mm long, 0.5–1.0 mm broad, scales minutely denticulate toward their tip; sterile fronds to ca. 1 m long, with stipe ⅓ as long as blade, to ca. 5 mm diam., stramineous, bearing toward the base patent scales like those of rhizome; sterile blades pinnate, with pinnae to ca. 12 pairs, largest ca. 25 cm long, 3–6 cm broad, subentire to coarsely serrate to crenately lobed, lobes broader than long; lowermost pinnae stalked to 1 cm, narrowed and unequally rounded at base, acuminate at apex, more distal pinnae sessile, then confluent into a deltoid, acutely lobed apex; costules ca. 1 cm apart, each with 3–4 pairs of arcuate veins, lowermost 2–3 pairs anastomosing with veins from adjacent costules to produce an excurrent veinlet that runs to the next anastomosis; leaf tissue glabrous on both sides, thick, subcoriaceous; fertile blade bipinnate, larger pinnules short-stalked, to ca. 2 cm long, 2–3 mm broad, repand- to entire-margined.

Climbing vine (hemiepiphyte) in Lower Montane and Montane rain forests; uncommon in Northern Highlands, s Sierra Madre; 500–1300 m. Southern Mex. (Ver.), Hond., Nic., C.R. Chiapas Collections: *P 6761* (UC, US, NY); *P 7245* (UC, US, NY); *R 972* (PH); *21886*; *32797*; *38011*.

The description above is drawn from Chiapas material only. Costa Rican specimens (at least the type) have fully bipinnate sterile blades. Additional study may show the Mexican specimens to represent an undescribed species.

2. **Polybotrya caudata** Kunze, Linnaea 9:23. 1834.

—*Olfersia caudata* (Kunze) Kunze, Linnaea 21:206. 1848. —Type: Peru, Pampayaco, Jul. 1829, *Poeppig s.n.*
Illustrations: Ettingshausen, Farnkr. pls. 4, 5, 10, 16, 17. "1865" [1864]; Fée, Mém. Fam. Foug. 2:pl. 34. 1845.

Rhizome densely clothed with linear-lanceolate, brown scales to ca. 1 cm long, 1 mm broad, scales erose-denticulate at margin; sterile fronds to ca. 1.3 m long, with stipe ca. ⅓ blade length, to ca. 5 mm diam., scaly at base; sterile blade bipinnate-pinnatifid at base, largest pinnae ca. 35 cm long, 12 cm broad, with pinnules lanceolate, truncate or cuneate at base, more developed on acroscopic side, to ca. 8 cm long, lobed ca. ⅓ on acroscopic side, less on basiscopic side, lobes truncate at tip, ca. 5 mm broad; pinnae progressively bipinnate distally, with serrate pinnules, ultimately merely pinnatifid; veins pinnate in ultimate segments, lowermost pair from adjacent segments meeting margin at the sinus; leaf tissue glabrous, but hairy on rachis, costae, and costules below, also in adaxial grooves, hairs below hyaline, acicular, patent, to ca. 0.5 mm long; fertile blade bipinnate-pinnatifid, pinnules long-caudate, to ca. 10 cm long, 2–3 mm broad.

Hemiepiphyte in Tropical Rain Forest; rare in Eastern Highlands near the Guatemala border; 300 m. Costa Rica, Pan., S.A. (to Peru, Bol., Braz.); Trin. Chiapas Collection: *34101*.

The differences between *P. caudata* and *P. villosula* Christ are rather minor and relate to the more dense pubescence of the latter species. Most specimens of *P. villosula* (known from Bel., Guat., Hond., Nic., C.R., Pan., Col.) have the leaf tissue, as well as the axes below, pubescent.

3. **Polybotrya cervina** (L.) Kaulf., Enum. Fil. 55. 1824.

—*Osmunda cervina* L., Sp. Pl. 2:1065. 1753. —*Acrostichum cervinum* (L.) Swartz, Syn. Fil. 14. 1806. —*Olfersia cervina* (L.) Kunze, Flora 7:312. 1824. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:223. 1977): Plumier, Tract Fil. Amer. pl. 154, 1705, illustrating a plant from Martinique.
Illustrations: Rovirosa, Pterid. Sur Mex. pl. 59. 1909 [as *Acrostichum cervinum*]; Hooker & Greville, Icon. Fil. 1:pl. 81. 1828; Proctor, Fl. L. Antill. 2:224, 225. 1977.

Rhizome densely clothed with linear-lanceolate, brown, entire, often tortuous scales to ca. 2 cm long, 1 mm broad; sterile fronds mostly 0.5–1.4 m long, with stipe shorter than blade, ca. 4 mm diam., scaly at base; sterile blade pinnate with a conform terminal pinna, pinnae ovate-lanceolate to lanceolate, 4–12 ascending pairs, largest mostly 15–25 cm long, 3–7 cm broad, ± entire, cartilaginous at margin; lowermost pinnae short-stalked to ca. 0.5 cm, broadly but unequally cuneate at base (often excavate below), acute to acuminate at apex; veins parallel, ca. 1 mm apart, oblique to costa, simple or usually forking at their base, free except for marginal commissural vein; leaf tissue glabrous on both sides, thick, subcoriaceous; fertile blade bipinnate, pinnules broadly adnate, to mostly 0.5–0.8 (1.0) cm long, 2–3 mm broad, entire. $n = 41$ (Jam., Trin.), $2n = 82$ (Jam.).

Terrestrial in lower elevation rain forests. Reported from Chiapas by Rovirosa (Pterid. Sur Mex. 257. 1909), "montañas de Moyos [Northern Highlands]," *Martinez s.n.* (1089); I have been unable to locate this collection. Widespread, known from Ver., Oax., Bel., Guat., Nic., C.R., S.A. (Ven. and Col. to Bol., s Braz.), Antill., Trin.

Species to Be Looked for in Chiapas

Polybotrya osmundacea Humb. & Bonpl. ex Willd. —Guat., Nic., C.R., S.A., Antill.; related to *P. caudata* but differing in having the fertile segment tips not caudate and often the basal acroscopic segment of the larger pinnules free or nearly free.

85. POLYPODIUM

Polypodium L., Sp. Pl. 2:1082. 1753. —Lectotype (first chosen by J. Smith?, Hist. Fil. 88. 1875): *Polypodium vulgare* L.
Marginaria Bory, Dict. Class. d'Hist. Nat. 6:587. 1824. —Lectotype (first chosen by ?): *Marginaria ceteraccina* (Michx.) Bory [=*Polypodium polypodioides* (L.) Watt].

Epiphytic or epipetric, infrequently terrestrial; rhizome creeping, dictyostelic, scaly; fronds stipitate, articulate to prominences of rhizome (phyllopodia), pinnatifid to pinnate (infrequently more divided), glabrous or scaly, pubescent in a few species; veins forked, often ending in hydathodes above, free or anastomosing to form areoles, each areole with one simple, excurrent, included veinlet; sori dorsal, terminal or nearly so on lowest acroscopic veinlet (the included one if areoles are present), orbicular to elliptic (rarely elongate), superficial or impressed, exindusiate; paraphyses none or filamentous; spores bilateral, hyaline, yellowish to whitish, with or without a perispore, tuberculate to smooth; gametophytes cordate, green; $x = 37$.

In a strict sense, as delimited by Copeland (1947), *Polypodium* comprises about 100–125 species, mostly of the American tropics and subtropics but with a few species in temperate regions of America, Europe, Asia, and Africa. Mexico is an important center of diversity for several species groups; altogether, perhaps 60 species occur there.

References: Evans, A. M. 1969. Interspecific relationships in the *Polypodium pectinatum-plumula* complex. Ann. Missouri Bot. Gard. 55:193–293; Maxon, W. R. 1903. A study of certain Mexican and Guatemalan species of *Polypodium*. Contr. U.S. Natl. Herb. 8:271–280; 1916. Studies of tropical American ferns—No. 6. Contr. U.S. Natl. Herb. 17:541–608; Sota, E. de la. 1966. Revision de las especies Americanas del grupo "*Polypodium squamatum*" L. Revista Mus. La Plata, Secc. Bot. 10:69–186.

a. Blade scaly on leaf tissue beneath, often densely so.
b. Sori elongate, several times longer than wide .... 9. *P. colysoides*
bb. Sori round or slightly oblong, never more than 1.5 times longer than wide.
c. Rhizome scales large, mostly pale and concolorous, thickened and dark colored (if at all) only near their point of attachment.
d. Blade pinnate-pinnatifid to bipinnate-pinnatifid .... 28. *P. lindenianum*
dd. Blade pinnatisect to pinnate.
e. Segments entire, usually perpendicular to rachis; blade linear-lanceolate in outline, slightly reduced below; veins diverging from costae at 45–60° .... 23. *P. furfuraceum*
ee. Segments undulate, crenulate, or serrulate, those in upper portion of blade angled toward apex; blade broadest at base; veins diverging from costae at 30–40°.
f. Veins usually simple, rarely forked near their apex; segments rounded-excavate to costae at basiscopic side; stipe much shorter than blade; scales on leaf tissue above .... 12. *P. cryptocarpon*
ff. Veins invariably 1-forked in their basal third, the proximal branch rarely forked; segments not excised below; stipe as long as blade or longer; scales absent above ..... 32. *P. platylepis*
cc. Rhizome scales smaller, more rigid, mostly bicolorous, with a dark, often sharply defined, elongate median area of sclerotic cells.
g. Rhizome ca. 1 mm diam., extensively creeping; rhizome scales ca. 0.5 mm long, bearing from their center a conspicuous, erect tuft of long, brown, bristlelike hairs .... 18. *P. fallax*
gg. Rhizome stouter, mostly >3 mm diam. (except *P. polypodioides*); rhizome scales much larger (>2 mm long), lacking hairs.
h. Veins free; blade with only a very few scales on leaf tissue below, without scales above.
i. Stipe alate nearly to rhizome .... 41. *P. remotum*
ii. Stipe nonalate.
j. Rhizome scales spreading, squarrose (giving rhizome a shaggy appearance), with very broad, pale, ruffled borders; segments strongly dilate at base (blade thus deeply pinnatisect) .... 33. *P. plebeium*
jj. Rhizome scales appressed-imbricate, with margins not ruffled; segments slightly, if at all, dilate (blade thus pinnate at base) .... 31. *P. montigenum*
hh. Veins anastomosing; blade with numerous scales above and below.
k. Rhizome scales small, roundish to triangular-ovate, closely appressed, contiguous or subimbricate.
l. Segments 3–6 (rarely 8) mm broad; lower surface brown from the presence of very numerous, contiguous or imbricate scales .... 44. *P. sanctae-rosae*
ll. Segments 9–13 mm broad; lower surface green, bearing numerous, distant, minute, roundish scales .... 8. *P. collinsii*
kk. Rhizome scales larger, variously shaped (never roundish), with long-acuminate to subacicular tips, oblique or subsquarrose, imbricate.
m. Fronds distant, rhizome relatively slender and wide-creeping.

n. Sori impressed, upper surface of segments strongly embossed; segments 2–5 mm wide ...... 37. *P. polypodioides*

nn. Sori superficial or nearly so; segments 3–15 mm wide ...... 45. *P. thyssanolepis*

mm. Fronds subfasciculate, rhizome short-creeping and relatively thick.

o. Rhizome scales light brown or grayish, often with a sharply defined fuscous median area; lower pinnae largest ...... 45. *P. thyssanolepis*

oo. Rhizome scales dark-castaneous to ferruginous, never sharply bicolorous; lower pinnae (several pairs) slightly reduced ...... 40. *P. pyrrholepis*

aa. Blade without scales on leaf tissue below, sometimes scaly on axes.

p. Veins regularly anastomosing, areoles in one to several rows.

q. Blade pinnate, at least at base.

r. Leaf tissue puberulent below; rhizome scales decidedly clathrate ...... 15. *P. dissimile*

rr. Leaf tissue glabrous below; rhizome scales weakly or not at all clathrate.

s. Sori in one row on both sides of costae ...... 35. *P. pleurosorum*

ss. Sori in 2–3 rows on both sides of costae.

t. Rhizome short-creeping, often ± nodose; rhizome scales, especially near apex, spreading, acuminate; distal pinnae strongly adnate ...... 46. *P. triseriale*

tt. Rhizome long-creeping, smooth; rhizome scales all ovate, appressed; distal pinnae weakly or not at all adnate ...... 22. *P. fraxinifolium*

qq. Blade pinnatisect (pinnae adnate and ± dilate at base).

u. Areoles in 2 rows on both sides of costae; rhizome scales subulate, spreading, stramineous .. 16. *P. eatonii*

uu. Areoles in 1 row on both sides of costae; rhizome scales lanceolate to ovate, appressed.

v. Rachis, costae, and leaf tissue below without hairs; rhizome scales ovate.

w. Veins and rachis often reddish or pinkish; rhizome scales somewhat waxy, tan, not clathrate; pinnae ± equally dilated at base, ± straight ...... 43. *P. rhodopleuron*

ww. Veins and rachis tan to brownish; rhizome scales brownish, subclathrate; pinnae sursumcurrent, lower edge perpendicular to rachis, lowermost upcurved ...... 30. *P. loriceum*

vv. Rachis, costae and often leaf tissue below pubescent; rhizome scales ovate or lanceolate.

x. Stipe and rachis stramineous below; rhizome scales ovate, acute at tip, ± entire.

y. Pinnae ± parallel-sided; leaf tissue glabrous; rhizome scales ± uniformly tan ...... 34. *P. plesiosorum*

yy. Pinnae lanceolate; leaf tissue hispidulous; rhizome scales with a darkened median strip ...... 26. *P. hispidulum*

xx. Stipe and rachis brownish to purplish brown below, shining; rhizome scales lanceolate, attenuate to filiform at apex, minutely papillate to denticulate along margin; pinnae lanceolate ...... 24. *P. fuscopetiolatum*

pp. Veins free, or only casually anastomosing.

z. Segments 2–8 mm broad, dilated or sursumcurrent; sori mostly round; fronds pectinate (*P. plumula-pectinatum* group).

a′. Rachis scales relatively conspicuous, persistent, other than filiform; rachis brown or black.

b′. Rhizome scales cordate with acute apex, noncomose; rachis scales narrow-elliptic or cordate with acute apex; sporangia with or without setae; rachis red-brown or black with lateral brown stripes.

c′. Rachis scales narrow-elliptic, few and sometimes inconspicuous, flat; basal segments of blade strongly reflexed; sporangia without setae; rachis red-brown or black with lateral brown stripes ...... 3. *P. alfredii*

cc′. Rachis scales cordate, numerous and conspicuous, bullate or flat; all segments perpendicular to rachis; sporangia with or without setae; rachis red-brown.

d′. Rhizome scales light golden color; rachis red-brown but costa black or darker brown than rachis; sporangia with 2 long setae ...... 19. *P. ferrugineum*

dd′. Rhizome scales red-brown; rachis and costa both red-brown; sporangia naked ...... 13. *P. cupreolepis*

bb′. Rhizome scales lanceolate with acuminate apex, comose; rachis red-brown or black without lateral stripes; rachis scales cordate, or lanceolate with acuminate apex and hastate base; sporangia always setose, sometimes inconspicuously so.

e′. Blade narrow-ovate or linear; segments linear, basal segments shorter, not deflexed, reduced to mere auricles; veins 1-forked ...... 36. *P. plumula*

ee′. Blade narrow-ovate; segments narrow-ovate, basal segments shorter, deflexed, sometimes reduced to auricles; veins 2-forked.

f′. Rachis scales subulate with hastate base; lower segments only slightly shortened, strongly deflexed; 64 reniform spores per sporangium ...... 4. *P. atrum*

ff′. Rachis scales narrow- to linear-triangular with hastate base; lower segments sometimes reduced to auricles, slightly deflexed; 32 globose spores per sporangium ...... 14. *P. dispersum*

aa′. Rachis scales absent, or if present, then filiform and inconspicuous; rachis brown (stramineous in *P. chiapense*).
  g′. Basal segments ½ as long as longest segments, or more.
    h′. Fronds mostly greater than 40 cm long; veins 2–3 forked; sporangia without setae .... 5. *P. bolivianum*
    hh′. Fronds mostly less than 40 cm long; veins 1-forked.
      i′. Stipe stramineous; costae and rachis below long septate-hairy, the hairs lax, ca. 1–2 mm long; sporangia glabrous .... 6. *P. chiapense*
      ii′. Stipe brownish; costae and rachis below short-hairy, the hairs stiff, <0.5 mm long; sporangia glabrous to setose.
        j′. Sporangia with acicular setae; blade pectinate, lower pinnae equally dilated at their base .... 27. *P. hygrometricum*
        jj′. Sporangia glabrous or with a few very inconspicuous setae; blade fully pinnate in lower ⅓ (pinnae neither sursumcurrent nor decurrent at base) .... 25. *P. hartwegianum*
  gg′. Basal segments less than ½ as long as longest segments, often reduced to wings, lobes, or auricles.
    k′. Blade essentially glabrous below, or with very small, scattered, appressed clavate hairs .... 10. *P. consimile* var. *consimile*
    kk′. Blade pilose in an oblong patch around the sori, otherwise glabrous, or with scattered acicular hairs, these then much denser around the sori .... 38. *P. ptilodon* var. *caespitosum*

zz. Segments often more than 8 mm broad; sori round or elliptical; segments adnate, distinct or dilated, the frond pectinate or pinnate (at least at base).
  l′. Blade mostly pectinate, only the few lowermost pairs of pinnae completely free (or no pinnae completely free); sporangia with or without setae; rhizome scales dark brown to orangish.
    m′. Sori round.
      n′. Segments serrate to crenulate.
        o′. Segments sharply serrate; stipe usually stramineous .... 20. *P. fissidens*
        oo′. Segments crenate-serrulate; stipe dark brown .... 7. *P. christensenii*
      nn′. Segments entire to subentire; stipe stramineous .... 39. *P. puberulum*
    mm′. Sori oblong.
      p′. Lowermost pinnae (3–6 pairs) somewhat reduced; costae and veins below with numerous, whitish, septate hairs 0.5–1.0 mm long; rhizome scales ferruginous, lanceolate, 4–5 mm long .... 25. *P. hartwegianum*
      pp′. Lowermost pinnae not reduced; costae and veins below glabrescent to slightly pubescent with acicular hairs <0.3 mm long; rhizome scales brownish, ovate, <3 mm long.
        q′. Medial pinnae strongly decurrent, 16–25 mm broad; pinnae relatively few, (6) 10–20 pairs; rhizome scales tan to orangish .... 42. *P. rhachipterygium*
        qq′. Medial pinnae more sursumcurrent than decurrent, mostly 12–16 (20) mm broad; pinnae usually more than 20 pairs; rhizome scales brownish.
          r′. Lowermost pinnae excised below, strongly sursumcurrent and adnate above; upper pinnae also sursumcurrent; sporangia glabrous .... 11. *P. conterminans*
          rr′. Lowermost pinnae not excised below, often with a small auricle overlapping the rachis above; upper pinnae ± equally dilate; sporangia glabrous to setose .... 29. *P. longepinnulatum*
  ll′. Blade primarily pinnate, pinnae adnate to rachis or not; sporangia with setae; rhizome scales golden to orangish.
    s′. Pinnae stalked, with a long-cuneate base; veins casually anastomosing; costae, veins, and leaf tissue below glabrous; blade texture coriaceous .... 21. *P. fraternum*
    ss′. Pinnae sessile, with a truncate base; veins nearly all free; costae, veins and sometimes leaf tissue below pubescent; blade chartaceous to thick-herbaceous.
      t′. Rhizome scales densely glandular, often subbullate or inrolled .... 17. *P. echinolepis*
      tt′. Rhizome scales glabrous, flat.
        u′. Pinnae entire, parallel-sided; sporangia long-hairy, hairs lax, 0.2–0.3 mm long; leaf tissue thick-herbaceous to subcoriaceous, dark green .... 2. *P. alavae*
        uu′. Pinnae crenulate, not precisely parallel-sided; sporangia glabrous or with a few setae 0.1–0.2 mm long; leaf tissue chartaceous, light green .... 1. *P. adelphum*

1. **Polypodium adelphum** Maxon, Contr. U.S. Natl. Herb. 8:275, pl. 62. 1903.

—Type: Mexico, Chiapas, *Ghiesbreght 244* in part (GH; isotypes BM! K! YU!).

Illustration: only the original.

Rhizome 5–8 mm diam.; rhizome scales orangish tan, concolorous, lanceolate-attenuate, ± spreading, glabrous, ca. 5 mm long; fronds 40–90 cm long; stipe stramineous to tan, glabrescent, ca. ⅓–⅔ blade length, 2–4 mm diam.; blade 15–25 cm broad, broadest at or near base, pinnate nearly throughout, with a subconform terminal segment or the apex ± confluent and lobed; rachis hairy to glabrescent, without scales; pinnae mostly 10–18 cm long, 1.2–2.2 cm broad, usually shallowly crenate, acute at apex, free at the cuneate to rounded base, sometimes petiolulate, becoming slightly adnate distally; veins 3–4-forked, free; leaf tissue membranaceous to chartaceous, glabrous; veins and costae below glabrescent to often hairy; sori round, midway between costa and margin, 1.0–2.0 mm diam., in single rows on both sides of costa; sporangia glabrous or with a few capsular hairs 0.1–0.2 mm long.

Epiphytic in Montane Rain Forest, Pine-Oak Forest, Pine-Oak-Liquidambar Forest, Pine-Oak-Arbutus Forest, Evergreen Cloud Forest; common in Central Plateau, uncommon in Northern Highlands (Jitotol Ridge), Sierra Madre; (1250) 2000–2700 m. Southern Mex. (Oax.), Guat. Chiapas Collections: *JTM 1220, 1221* (NY, US), *1222* (US); *GM 72* (DS, P); *GM 79* (DS, US); *G 205* (K); *Gi 4229, 4230* (NY); *T&L 41482* (DS); *A 1314* (UC); *RMK 2807* (US), *3058* (UC), *3074* (DS, UC, US); *R&R 2054* (MEXU, US); *22408*; *22596*; *26181*; *26833*; *27188*; *27546*; *31332*; *31553*; *31956*; *32019*; *32318*; *37299*; *40701*; *40737*; *41325*; *41403*; *42029*; *42034*; *42035*.

This species seems to be much more variable than Maxon believed. Smaller plants often have nearly entire pinnae, while larger plants are characteristically crenulate-margined or even somewhat lobed at the base. A few collections (e.g., *31332* from Cerro Baul on the Oaxaca border) approach *P. subpetiolatum* Hook., which is common in western Mexico; it differs from *P. adelphum* in having minutely serrulate pinnae.

2. **Polypodium alavae** A. R. Smith, Amer. Fern J. 70:21, figs. 11–12. 1980.

—Type: Mexico, Chiapas, ca. 3 mi. from Jola along trail from Jola to Chanal, *Alava 1287* (UC! isotype DS!).

Illustration: only the original.

Rhizome 5–8 mm diam., bearing orangish-tan, ovate-lanceolate, somewhat spreading, concolorous, glabrous scales ca. 5–10 mm long; fronds arching, (17) 40–85 cm long; stipe stramineous to brownish, sparsely hairy to glabrescent, ca. ⅓–⅔ blade length, (1) 3–5 mm diam.; blade deltoid-lanceolate, (7) 14–30 cm broad, broadest at base, pinnate nearly throughout, with a confluent, pinnatifid to subconform apex; rachis moderately to sparsely hairy, without scales; pinnae mostly 7–16 cm long, 7–10 mm broad, parallel-sided for most of their length, lower ones slightly narrowed toward their base, entire to faintly crenulate, acute at apex, rounded at base, usually sessile, usually becoming adnate their width about halfway to blade tip (but never dilate); veins (2-) 3-forked, free; leaf tissue dark olive-green, subcoriaceous, glabrous or sparsely hairy on both sides; costae and veins below with scattered to numerous, lax, septate hairs mostly 0.3–0.8 mm long; sori round, medial to supramedial, mostly ca. 2 mm diam.; sporangia with several (ca. 6) long (0.2–0.3 mm), lax, capsular hairs.

Epiphytic in Pine-Oak-Liquidambar Forest; uncommon in Central Plateau; 1300–2000? m. Southern Mex. (Chis. only), Hond. Chiapas Collections: *22337*; *32126*; *37005*.

Closely related to *P. adelphum*, from which it differs in the narrower, more parallel-sided, entire pinnae, long-hairy sporangia, and more coriaceous, dark green leaf tissue. Also related to *P. puberulum* but lacking the densely hairy leaf tissue on both surfaces and with lower pinnae constricted at their base.

3. **Polypodium alfredii** Rosenst., Repert. Spec. Nov. Regni Veg. 22:15. 1925.

—Type: Costa Rica, Turrialba, *Brade & Brade 697* (S; isotype US).

Polypodium cyathicola Copel., Univ. Calif. Publ. Bot. 19:292, pl. 43. 1941. —Type: Mexico, Veracruz, Cuautlancillo, *Copeland, Mex. Ferns 127* (MICH; isotypes UC! US).

Illustration: see above under *P. cyathicola*.

Rhizome 3–5 mm diam.; rhizome scales orangish brown, dull to sublustrous, ovate to cordate, acute to rounded at tip, entire or rarely irregularly fimbriate toward apex; fronds (10) 20–60 cm long, fasciculate, with stipe ca. 1/10–1/5 blade length, 1 mm diam., reddish brown or blackish with lateral brown stripes, with scattered, acicular hairs; blade 3–10 cm broad, narrowly oblong, cuneate at base or subtruncate with lower segments strongly deflexed; rachis scales brownish, acute, entire, bullate-cordate to usually narrow-ovate, with or without a hastate base, conspicuous to inconspicuous; segments linear-lanceolate to linear, acute, 15–50 cm long, (1.5) 2–3.5 mm wide, symmetrically dilated at base in upper half of frond, lower edge perpendicular to rachis in lower half of frond, all segments adnate, entire; veins 1-forked, free; leaf tissue chartaceous, with scattered, short, clavate hairs; costae brown, occasionally darker than rachis, with scattered long, acicular hairs, slightly decurrent on, or perpendicular to, rachis; sori supramedial to submarginal, round, with numerous, clavate paraphyses; sporangia without setae; spores 64 per sporangium; $n = 37$ (Oax., C.R.).

Epiphytic, occasionally terrestrial or on rocks, in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, infrequently Evergreen Cloud Forest, Pine-Oak Forest, Seasonal Evergreen Forest; common in Northern Highlands, scattered in Central Plateau and Sierra Madre; (600) 1200–2100 (2700) m. Southern Mex. (Hgo., Ver., Pue., Mlos., Oax.), Guat., Hond., Nic., C.R. Chiapas Collections: *G 262* (BM, K); *EM 5598* (US); *R 211* (PH); *MC 1615, 1777* (US); *T 2864* (DS); *GM 121* (DS, P, US); *T&L 41767* (DS); *21591*; *21708*; *21733*; *22307*; *22975*; *23105*; *24994*; *26819*; *27514*; *27713*; *28945*; *31331*; *31423*; *31431*; *32127*; *32257*; *32377*; *32500*; *33574*; *34603*; *35206*; *38771*; *41003*; *41723*; *42678A*.

4. **Polypodium atrum** A. M. Evans, Ann. Missouri Bot. Gard. 55:237, fig. 18. 1969.

—Type: Belize, El Cayo Distr., Mountain Pine Ridge, San Augustin, *Lundell 6639* (US; isotypes GH, MICH).

Illustration: only the original.

Rhizome 4–6 mm diam.; rhizome scales red-brown, concolorous, lanceolate, expanded at base, comose; fronds 30–65 cm long, approximate; stipes black, with scattered, long, simple, acicular hairs, 1/5–1/2 blade length; blade narrow-oblong, 21–50 cm long, 6–13 cm wide, subtruncate or abruptly cuneate at base; rachis scales small, linear-lanceolate, often hastate at base, entire; pinnae 32–70 mm long, 3–7 mm wide, entire, obtuse, symmetrically dilated at base in upper half of blade, lower edge perpendicular to rachis in lower half of blade, basal pinnae slightly reduced and strongly deflexed or occasionally abruptly reduced to auricles, spaces between segments equaling or exceeding width of segments; costae perpendicular to rachis, black throughout or dark red-brown at base, with scattered, long, acicular hairs; veins 2-forked, free; leaf tissue chartaceous, with scattered acicular hairs and short clavate hairs; sori round, medial; sporangia mostly with 3 or 4 two-celled capsular setae; spores 64 per sporangium, globose-reniform.

Terrestrial, epipetric, or epiphytic in Tropical and Lower Montane rain forests, Seasonal Evergreen Forest; uncommon in Northern and Eastern highlands (but not Jitotol Ridge), s Sierra Madre, Central Depression; 300–950 m. Southern Mex. (Ver., Oax., Tab.), Bel., Guat., Hond., Nic. Chiapas Collections: *EM 209* (US); *C&D 167* (US); *21926*; *27482*; *29042*; *32805*; *33151*; *38168*; *38180*; *38680*; *39995*; *42839*.

5. **Polypodium bolivianum** Rosenst., Repert. Spec. Nov. Regni Veg. 5:236. 1908.

—Type: Bolivia, South Yungas, Sirupaya near Yanacachi, *Buchtien 481* (S; isotypes P! US).

Illustration: none found.

Rhizome 6–10 mm diam.; rhizome scales dark red-brown, concolorous, lanceolate-acuminate, expanded at base, comose, with hairs often obscuring scales; fronds spaced ca. 1 cm apart to approximate, (35) 50–110 (135) cm long, with stipe dark red-brown, bearing numerous ctenoid hairs (infrequently with short acicular hairs), 1/5–1/2 blade length, (1.5) 2–3 mm diam.; blade (10) 15–27 cm wide, truncate or lower segments slightly shortened; rachis scales absent or inconspicuous, small, filiform; pinnae 45–100 (145) mm long, 4–9 mm wide, entire, obtuse to acute, symmetrically dilated at base, often slightly constricted near base, perpendicular to rachis or lower segments occasionally deflexed; costae perpendicular to rachis, with a few clavate and ctenoid hairs below; veins 2–3-forked, free or occasionally partially anastomosing, obscure; leaf tissue chartaceous to subcoriaceous, glabrous or with a few short hairs; sori round, supramedial, with a cluster of setiform hairs around receptacle; sporangia without setae; $n = 37$ (Chis., C.R.).

Epiphytic or terrestrial at the base of trees, in Lower Montane and Montane rain forests, infrequently Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Seasonal Evergreen Forest; common in Northern Highlands (not Jitotol Ridge), scattered in E edge of Central Plateau, Eastern Highlands; 600–1350 (1600) m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol.). Chiapas Collections: *G 394* (K); *GM s.n.* (DS, US); *20284*; *21639*; *21672*; *21851*; *21852*; *22145*; *27922*; *27939*; *29129*; *31499*; *31509*; *32135*; *32277*; *32899*; *38034*; *38954*; *42011*; *42091*.

Polypodium divaricatum Fourn. (Mex. Pl. 1:80. 1872), type from Mexico, Veracruz, *Galeotti 6287* (isotype BR!) is most likely this species; the name has priority over *P. bolivianum*. There is a small chance that it is the same as *P. ptilodon*, which occurs in the same region. Evans (1969) did not discuss the identity of *P. divaricatum*, but it is certainly a member of this group.

6. **Polypodium chiapense** Evans & Smith, Amer. Fern J. 70:23, figs. 16–17. 1980.

—Type: Mexico, Chiapas, Munic. Ocozocoautla de Espinosa, Selva del Ocote, 32 km NW of Ocozocoautla, *Breedlove 27453* (DS!).

Illustration: only the original.

Similar to *P. hygrometricum*, but the stipe stramineous to tan, villose with soft, silvery, lax, septate hairs ca. 1 mm long; rachis stramineous, with similar hairs 1–2 mm long; segments all perpendicular to rachis; leaf tissue with numerous, lax, silvery, septate hairs 1–2 mm long, these densest along costa; sporangia glabrous.

Epiphytic in Lower Montane Rain Forest; locally common in Northern Highlands, also perhaps s Sierra Madre; 600–1000 m. Known only from Chiapas. Chiapas Collections: *P 6754*, pt. (UC, US); *P 7225* (UC, US); *20281*; *21671*; *31231*; *31537*.

7. **Polypodium christensenii** Maxon, Contr. U.S. Natl. Herb. 13:10. 1909.

—Type: Guatemala, Alta Verapaz, near Cobán, *von Tuerckheim II 2179* (US 591558; isotype BR! fragm. BM!).

Illustration: none found.

Very similar to *P. puberulum* but seemingly differing in the larger fronds (to 1.2 m long); stipe dark brown; pinnae irregularly crenulate-serrate along margins; and perhaps in rhizome scales without such a greatly expanded base, not so long-attenuate and spreading; $n = 37$ (Chis.).

On mossy banks, margins of Montane Rain Forest, Evergreen Cloud Forest; uncommon in Central Plateau, s Sierra Madre; 2000–2400 m. Otherwise known only from Guatemala. Chiapas Collections: *32006*; *34803*; *41087*.

In describing this species, Maxon compared it to *P. biauritum* [=*P. longepinnulatum*] and *P. macrodon* [=*P. echinolepis*]. However, I believe that *P. christensenii* is much more closely allied to, and possibly conspecific with, *P. puberulum*. Another close relative is *P. alavae*, but that species has long-pilose sporangial capsules and narrower, entire pinnae. This group of free-veined, hairy polypodiums (including *P. adelphum*) is badly in need of revision.

8. **Polypodium collinsii** Maxon, Contr. U.S. Natl. Herb. 17:583, pl. 41. 1916.

—*Goniophlebium collinsii* (Maxon) Conzatti, Fl. Tax. Mex. 1:106. 1939. —Type: Mexico, Chiapas, near Pantepec, *Collins & Doyle 227* (US).

Polypodium mickelii de la Sota, Revista Mus. La Plata, Secc. Bot. 10:163, pl. 8. 1966. —Type: Mexico, Oaxaca, s of Villa Alta, *Mickel 1130* (ISC; isotype LP).

Illustrations: see those cited above, both photographs of types.

Rhizome sinuous, (3) 4–6 (8) mm diam., smooth, but bearing appressed, imbricate, peltate, fimbriate scales 0.5–1.0 mm diam., these bicolorous with a darker center; fronds 45–90 cm long, two-thirds to equaling blade length, 2.5–5.0 mm diam., with appressed, peltate scales like those of rhizome; blade deltoid to deltoid-ovate, 9–24 cm broad, deeply pinnatisect with a confluent, subconform terminal pinna, lowermost pinnae longest or nearly so; rachis appressed-scaly; pinnae (5) 10–35 pairs, lanceolate, 5–11 (13) mm broad, entire, acute to acuminate at tip, lower pinnae sursumcurrent and slightly excised below, all pinnae adnate; veins anastomosing to form a single row of areoles on both sides of costa, not easily seen; leaf tissue subcoriaceous, lower surface with nonoverlapping, peltate scales, upper with scattered stellate scales; sori round, medial; sporangia glabrous; $n = 37$ (Chis.).

Usually terrestrial, in Montane Rain Forest, Pine-Oak-Liquidambar Forest; locally common in Northern Highlands (Jitotol Ridge), N Sierra Madre; 1400–1700 m. Southern Mex. (Oax., Ver.). Chiapas Collections: *P 237* (US); *R 845* (PH); *Bo 8446* (US); *R&R&M 1207* (US); *T&L 41575* (DS); *19893*; *23117*; *24924*; *31333*; *32353*.

I am unable to distinguish *P. mickelii*. According to de la Sota, it is distinguished by its larger fronds, more deltoid blades, flattened and more robust rachis, and greater number of narrower pinnae. At the time of his monograph, de la Sota had seen only two specimens of *P. mickelii* and three of *P. collinsii*. With the larger number of specimens available to me, the distinctions mentioned by de la Sota seem to be not significant, being related mostly to size of fronds, which is highly variable in this species and related ones.

9. **Polypodium colysoides** Maxon & Copel. ex Copel., Univ. Calif. Publ. Bot. 19:292, pl. 45. 1941.

—Type: Mexico, Veracruz, Atoyac River, Ojo de Agua, *Copeland 135* (MICH; isotypes GH, UC!, US).

Illustrations: original; also Evans & Mickel, Brittonia 21:258 (fig. 3, E–F). 1969.

Rhizome ca. 2–3 mm diam.; rhizome scales tan, faintly bicolorous, lanceolate-attenuate, ca. 5 mm long; fronds erect, to 40 cm long, often subdimorphic, the fertile longer-stiped and with more pinnae; stipe brownish, often narrowly alate, persistently scaly, ⅓–2 times blade length, 1.5–2.5 mm diam.; blade extremely variable, from simple to deeply pinnatisect to fully pinnate, to 12 cm broad; rachis scaly; pinnae 0–5 pairs, elliptic, 7–20 mm broad, narrowed just beyond the adnate base, acute at apex; veins anastomosing to form a series of elongate areoles, not easily seen; leaf tissue subcoriaceous, on both sides bearing scattered, appressed, lanceolate scales ca. 0.5–1.0 mm long from a peltate base; sori oblique, oblong (2–3 mm long) to elongate (10 mm); sporangia glabrous.

Epiphytic or terrestrial in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; rare in Northern Highlands and SE Central Plateau; 700–1350 m. Southern Mex. (Ver.). Chiapas Collections: *22284*; *22496*; *32552*.

The affinities of this unusual species (as a synonym of *P. bradeorum* Rosenst.) have been discussed recently by Evans and Mickel (Brittonia 21:255–260. 1969), who concluded that it might be most closely related to the genera *Microgramma* and *Pleopeltis*. On the basis of its laminar scales, I believe that it is most closely related to *Pleopeltis*, but my uncertainty is such that I hesitate to make the transfer. Another possibility is that it has had a hybrid origin between a *Polypodium* and a *Pleopeltis*; just what species might be involved, I cannot say. Gómez P. (Brenesia 10/11:115–119. 1977) has recently described the monotypic new genus *Pseudocolysis* to include this species (as *P. bradeorum*).

On the basis of its generally pinnatisect fronds, I maintain *P. colysoides* as distinct from *P. bradeorum*, known from Costa Rica and Nicaragua. As Evans and Mickel pointed out, a third species of this very unusual group is *P. pleolepis* Maxon & Copel. ex Copel., known only from Guatemala. It differs from *P. colysoides* in having round or slightly oblong sori and in having thicker, more paleate blades. Its relationship is certainly with *Pleopeltis*.

10. **Polypodium consimile** Mett., Ann. Sci. Nat. Bot. (5)2:253. 1864.

—*Polypodium consimile* Mett. ex D. C. Eaton, Mem. Amer. Acad. Arts (n.s.) 8:198. 1860 (nom. nud.). —Type: Colombia, Ocaña, "Norte de Santander," *Schlim 633* (B; isotypes BR, G, L).

Illustration: none found.

Closely related to *P. ptilodon*, agreeing with that species in the absence of rachis scales, basal segments gradually reduced to lobes or wings, veins 2-forked; differing from *P. ptilodon* by the glabrous leaf tissue below, without hairs in an oblong patch around the sorus.

Epiphytic in Lower Montane Rain Forest; rare in Northern Highlands; 800 m. Southern Mex. (Chis. only), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col.); Hisp., Jam. Chiapas Collection: *38195*.

The Chiapas collection is referable to var. *consimile*; variety *pastazense* (Hieron.) A. M. Evans occurs in Colombia and Ecuador.

The sole Chiapas collection was identified by Evans. It greatly resembles collections of *P. ptilodon* var. *caespitosum* from the same area, and I am able to distinguish the two only by the complete absence of hairs on the blade below in *P. consimile*.

11. **Polypodium conterminans** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:201. 1849.

—Syntypes: Mexico. Veracruz. "Hac. de Mirador," 10/41, *Liebmann* [Liebm. Pl. Mex. 2493, Fl. Mex. 138] (C!); "Hac. de Mirador," 3/42, *Liebmann* [Liebm. Pl. Mex. 2493, Fl. Mex. 141] (C! photo BM! US!); "Aguas santas pr. Mirador," 11/41, *Liebmann* [Liebm. Pl. Mex. 2493, Fl. Mex. 139] (C!). I choose Fl. Mex. 139 as lectotype; probable isolectotype BM! fragm. US! Flora Mex. 138 is a mixed collection; center plant is *P. conterminans* while two smaller (juvenile) lateral plants are either *P. rhodopleuron* or possibly *P. plesiosorum*.

Polypodium surcurrens A. R. Smith, Proc. Calif. Acad. Sci. (4)40:223, fig. 5, A–C. 1975. —Type: Mexico, Chiapas, Munic. Cintalapa, 16 km NW of Rizo de Oro, SE of Cerro Baul, *Breedlove* (with *Smith*) *31311* (DS!).

Illustration: see under synonymy.

Similar to *P. longepinnulatum* Fourn., but with the lowermost pinnae excised below, strongly sursumcurrent and adnate above, upper pinnae also sursumcurrent; sporangia glabrous.

Epiphytic or on rocks in Montane Rain Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, N Sierra Madre; 800–1600 m. Southern Mex. (Ver.). Chiapas Collections: *21795*; *24922*; *28918*; *31311* (type); *32493*; *33118*.

Polypodium conterminans generally grows at lower elevations than *P. longepinnulatum* and has never been collected in Evergreen Cloud Forest, where *P. longepinnulatum* is relatively common. The two have been collected together at a single station in the Northern Highlands.

Polypodium arthropodium Fée (Mém. Fam. Foug. 8:88. 1857) is possibly another synonym of *P. conterminans*, but I have not located type material ("Vallée du Mexique; Huatusco, Corboda et Orizaba," *Schaffner 185* and *186*).

12. **Polypodium cryptocarpon** Fée, Mém. Fam. Foug. 8:88. 1857.

—Type: Mexico [Veracruz], Cordoba, *Schaffner 194* (presumably P).

Polypodium skinneri Hook., Sp. Fil. 4:214, pl. 276B. 1862. —Type: Guatemala, *Skinner s.n.* [31?] (K!).

Polypodium bernouillii Baker *in* Hook. & Bak., Syn. Fil., ed. 2, 510. 1874. —Type: Guatemala, Mazatenango, *Bernouilli 442* (K! isotypes P—2 sheets!).

Illustration: see under synonymy above.

Rhizome ca. 2–3 mm diam.; rhizome scales whitish tan, concolorous, lanceolate, appressed, ca. 5 mm long; fronds 10–45 cm long; stipe brownish, scaly, ca. ¼ to ⅓ blade length; blade linear, ± parallel-sided, 13–40 mm broad, deeply pinnatisect or seemingly pinnate at base, apex with a confluent subconform or pinnatifid segment; rachis scaly; pinnae numerous (to 60 pairs), linear, horizontal, 1.5–3.5 mm broad, with margins subentire, obtuse to subacute at tip, at the base sursumcurrent above, excised nearly to midvein below (at least lower pinnae); veins free, very oblique, not easily seen; leaf tissue subcoriaceous, bearing scattered, nonoverlapping, peltate to peltate-ovate scales below and fewer similar scales above; sori round, obscured when young by scales; sporangia glabrous.

Epiphytic in Tropical, Montane, and Lower Montane rain forests, rarely Seasonal Evergreen Forest; common in Northern Highlands (but not known from Jitotol Ridge), rare (one collection each) in s Sierra Madre, Eastern Highlands; 200–1000 m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic. Chiapas Collections: *P 6752* (UC—atypical); *R 858* (K, PH); *H&S 20180* (US); *10341*; *20282*; *21658*; *21853*; *21877*; *22435*, pt.; *26349*; *27447*; *28131*; *28133*; *29733*; *30898*; *31239*; *31487*; *32847*; *32867*; *35287*; *38697*; *42849*.

It is remarkable that this species is so common in the Northern Highlands but absent or nearly so elsewhere in the state.

13. **Polypodium cupreolepis** A. M. Evans, Ann. Missouri Bot. Gard. 55:224, fig. 17, pt. 1969.

—Type: Mexico, Michoacán, hills of Patzcuaro, *Pringle 3353* (US; isotypes B, GH, MICH, MO, UC! US).

Illustration: only the original.

Similar to *P. alfredii* but with stipe generally longer, $^1/_5$–$^2/_3$ blade length; rachis scales numerous, conspicuous, broadly cordate, bullate, acute, golden to tan; segments perpendicular to rachis, or occasionally ascending in upper part of blade, reduced and perpendicular or deflexed at blade base.

Epiphytic or terrestrial, Montane Rain Forest, Evergreen Cloud Forest; rare in s Sierra Madre; 2000–2400 m. Western and s Mex. (Sin., Dgo., Jal., Hgo., Pue., Mlos., D.F., Méx., Mich., Cma., Gro., Oax.), Guat., Salv., Nic., C.R. Chiapas Collections: *EM 4268*, pt. (GH, not seen, cited by Evans, 1969); *31941*.

Evans (1969:225) stated that the nearest relative of *P. cupreolepis* appeared to be *P. ferrugineum*. I believe that *P. cupreolepis* is also very close to *P. alfredii,* and I have sometimes encountered difficulty in distinguishing the two, especially in the Sierra Madre.

14. **Polypodium dispersum** A. M. Evans, Amer. Fern J. 58:173, pl. 27. 1968.

—Type: Florida, Citrus Co., Pineola Grottoes, *Evans 2008* (MICH; isotypes TENN, US).

Illustration: see the original.

Similar to *P. atrum,* differing in the slightly broader rachis scales (linear-lanceolate); lower segments sometimes reduced to auricles, slightly or not at all deflexed; 32 globose to ovoid spores per sporangium; $n = 111$, $2n = 111$, thus apogamous (Fla., Jam.).

Epiphytic, in Pine-Oak-Liquidambar Forest; rare, known only from Northern Highlands (Jitotol Ridge); 1250–1700 m. Eastern and s Mex. (Tam., S.L.P., Hgo., Ver., Oax.), Bel., Guat., Hond., Nic.; S.A. (Ven. and Col. to Bol., s Braz.); Gr. Antill. Chiapas Collections: *26041*; *32314*.

Evans (1969:237) postulated that *P. dispersum* originated as a hybrid between *P. atrum,* a presumed diploid, and *P. plumula,* a tetraploid species.

15. **Polypodium dissimile** L., Syst. Nat., ed. 10, 2:1325. 1759.

—Type: Jamaica, *Browne* (LINN 1251.24). Lellinger (Amer. Fern J. 67:100. 1977; op. cit. 70:30. 1980) recently discussed the misapplication of this name.

Polypodium chnoodes Spreng., Neue Entdeck. Pflanzenk. 3:6. 1822. —*Goniophlebium chnoodes* (Spreng.) Fée, Gen. Fil. 255. 1852. —Type: Martinique, *Kohaut* (*Sieber* exsicc.).

Polypodium retrofractum Desv., Mém. Soc. Linn. Paris 6:237. 1827. —Type: "Habitat in America calidiori," collector not stated (P!).

Illustration: Kepler, Common ferns Luquillo Forest, Puerto Rico 55, fig. 20A. 1975.

Rhizome ca. 6–14 mm diam., densely clothed with spreading, dark brown to blackish, linear-lanceolate, strongly clathrate, iridescent scales 5–10 mm long; fronds arching, mostly 35–110 (130) cm long; stipe stramineous to tan, ca. ¼ blade length, 1–3 mm diam.; blade 8–22 (25) cm broad, lowermost 1–5 pairs of pinnae slightly reduced and deflexed, pinnate in basal half of blade, increasingly pinnatisect distally, with a confluent lobed apex; rachis hairy, without scales; pinnae to 14 cm long, 10–16 (20) cm broad, often falcate, truncate to subcordate-clasping at base, entire- or faintly undulate-margined, acute at apex; veins anastomosing to form series of 2–4 areoles on both sides of costa; leaf tissue chartaceous, often thin, with whitish septate hairs on both sides, veins and costae also hairy, hairs to 1.5 mm long; sori round, ca. 1 mm diam., in 2–3 (4) rows on both sides of costae; sporangia glabrous; $n = 37$, $2n = 74$ (Jam.).

Epiphytic in Montane and Tropical rain forests, Seasonal Evergreen Forest; uncommon in Eastern Highlands, ne edge of Central Plateau; 350–900 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col., Ven.); Antill., Trin. Chiapas Collections: *GM 40* (DS); *27949*; *29887*; *32906*; *33296*.

16. **Polypodium eatonii** Baker, Syn. Fil., ed. 2, 511. 1874.

—*Polypodium ghiesbreghtii* D. C. Eaton, Proc. Amer. Acad. Arts 8:618. 1873 (not Hook. & Bak., 1867). —*Goniophlebium eatonii* (Baker) Maxon, Contr. U.S. Natl. Herb. 16:60, pl. 33. 1912. —Type: Mexico, Chiapas, *Ghiesbreght 273* (YU—2 sheets, photos BM! P!; isotypes BM! K! PH!).

Goniophlebium pringlei Maxon, Proc. U.S. Natl. Mus. 27:954, pl. 48. 1904. —Type: Mexico, Veracruz, near Jalapa, *Pringle 11855* (US; isotypes P! UC!).

Illustrations: see above under synonymy.

Rhizome ca. 5 mm diam., rhizome scales tan, lanceolate-acuminate, ± spreading, ca. 5–7 mm long; fronds 17–40 cm long; stipe stramineous, glabrous, ca. ¼–⅓ blade length, 1–2 mm diam.; blade to 16 cm broad, pinnatisect with a confluent, subconform terminal segment; rachis glabrous; pinnae 4–8 pairs, elliptic-lanceolate, 1.5–2.0 cm broad near base, adnate, sursumcurrent, lower ones rounded to cordate-clasping basiscopically; sinuses between pinnae broad, about as wide as pinnae; veins anastomosing, forming usually two rows of areoles on both sides of costae; leaf tissue subcoriaceous, glabrous on both sides; sori round, ca. 2–3 mm diam., in single rows on both sides of costae; sporangia glabrous; *n* = 37 (Ver.).

Epiphytic in Pine-Oak-Liquidambar Forest; rare in Northern Highlands (Jitotol Ridge), N Central Plateau; 1400–1700 m. Southern Mex. (Ver.). Chiapas Collections: *G 273* (BM, K, PH); *GM s.n.* (DS, P); *GM 61* (DS); *T&L 41060* (DS); *6210*.

Some Chiapas specimens do not have the cordate-clasping segment bases mentioned by Maxon but otherwise agree with his characterization. *Polypodium eatonii* is closely related to *P. arcanum* Maxon, and I am not sure that the two can be distinguished; if the two are combined, *P. eatonii* is the oldest name.

17. **Polypodium echinolepis** Fée, Mém. Fam. Foug. 8:87. 1857.

—Type: Mexico [Veracruz], Cordoba, *Schaffner 188* (presumably P).

Polypodium sessilifolium Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:192. 1849 (not *P. sessifolium* Desv., 1827) [I regard "sessifolium" as a typographical error for "sessilifolium," the spelling on the type specimen (P!) and the spelling used by Mettenius (Abh. Senckenberg. Naturf. Ges. 2:85. 1857]. —Type: Mexico, Veracruz, "Baranca de Huitamalco," *Liebmann* [Fl. Mex. 697] (C!).

Polypodium insigne Liebmann, Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:193. 1849 (not Blume, 1828). —*Polypodium plectolepis* Hook., Sp. Fil. 5:30. 1863. —Type: Mexico, Veracruz, "Hacienda de Mirador," *Liebmann* [Liebm. Pl. Mex. 2719, Fl. Mex. 698 and 700; Liebm. Pl. Mex. 2720, Fl. Mex. 699] (all C! photos UC! US). I choose as lectotype Fl. Mex. 700, the only specimen with rhizome.

Goniophlebium plectolepis Fée, Mém. Fam. Foug. 8:95. 1857. —Type: Mexico [Veracruz], "près d'Orizaba," *Schaffner 187* (presumably P).

Goniophlebium serratum Fée, Mém. Fam. Foug. 8:95. 1857 (not *Polypodium serratum* Aubl., 1775). —Type: Mexico, Veracruz, "Orizaba," *Schaffner 495* (P!).

Polypodium macrodon Hook., Sp. Fil. 4:218. 1862. —*Polypodium legionarium* Baker *in* Hook. & Bak., Syn. Fil. 337. 1867 (nom. superfl.). —Type: Guatemala, Alta Verapaz, "Cobar" [Cobán], *Salvin s.n.* (K!).

Illustration: **Fig. 72.**

Rhizome ca. 6–10 mm diam., bearing dense, spreading, lanceolate-attenuate, tan, concolorous scales ca. 4–5 mm long, these rather densely glandular-hairy, often subbullate; fronds arching, (32) 45–100 cm long; stipe stramineous to tan, glabrescent to sparsely hairy, ca. ⅓–⅔ blade length, 1.5–5 mm diam.; blade lanceolate, ca. (8) 15–32 cm broad, pinnate nearly throughout with a subconform to slightly lobed terminal pinna to 13 cm long; rachis sparsely hairy, without scales; pinnae linear-lanceolate, 1.2–2.2 cm broad, regularly crenate-serrate along margin, acute at tip, truncate at base, upper ones slightly adnate; veins 3–5-forked, ± free or casually anastomosing; leaf tissue chartaceous, densely hairy on both sides, hairs to 0.5 mm long, septate, whitish; sori inframedial to medial, round, 1.5–2.5 mm diam.; sporangia with several conspicuous capsular hairs ca. 0.2–0.3 mm long; *n* = 37 (Ver.).

Epiphytic, rarely on rocks, in Lower Montane and Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, SE corner of Central Plateau; 800–1700 m. Southern Mex. (Hgo., Ver.), Guat., Hond., Nic.? Chiapas Collections: *G 294* (YU), *393* (GH, YU), neither seen, cited by Maxon (Contr. U.S. Natl. Herb. 8:275. 1903) as *P. legionarium*; *21669*; *22156*; *22189*; *28919*; *29135*; *29888*; *29897*; *32320*; *32661*; *38953*; *41965*.

18. **Polypodium fallax** Schlecht. & Cham., Linnaea 5:609. 1830.

—Type: Mexico [Veracruz], Misantla, *Schiede & Deppe [758]* (isotype B, photo BM!).

Polypodium tuerckheimii Christ, Bull. Herb. Boissier (2)5:254. 1905. —Type: Guatemala, Alta Verapaz, Cubilquitz, *Türckheim s.n.* [ed. Donn.-Smith 7721] (P! photo BM!).

Illustration: Fée, Gen. Fil. pl. 10A, fig. 2. 1852.

Rhizome ca. 0.4–0.5 mm diam., greenish; rhizome scales scattered, brownish, comose, minute; fronds mostly 1.5–5.0 (7.0) cm long, sometimes subdimorphic, the fertile longer and with more distant and narrower pinnae than the sterile; stipe greenish to darkened on underside, bearing minute, scattered scales, ca. ⅓–⅔ blade length, <0.5 mm diam.; blade 5–15 mm broad, pinnate-pinnatifid; rachis with scattered scales; pinnae 3–7 pairs, lowermost pinnatifid, upper ones usually simple, linear; veins free, not easily seen, leaf tissue subcoriaceous, bearing below scattered (nonoverlapping), brownish, appressed, attenuate scales from a peltate base, these 0.5–0.8 mm long, upperside glabrous; sori mostly confined to distal pinnae, round, often only 1 (4) per pinna; sporangia glabrous.

Epiphytic in Tropical, Lower Montane, and Montane rain forests; relatively common in Northern and Eastern highlands, N edge of Central Plateau (not known from Jitotol Ridge); 300–1250 m. Southern Mex. (Hgo., Ver., Pue., Oax.), Bel., Guat., Hond., Nic., C.R. Chiapas Collections: *R 864* (PH); *G 447* (BM, K, PH); *H&S 20186* (US); *Dr 1621* (MEXU, UC); *GM s.n.* (DS, P); *Li 1549* (K); *21054*; *21660*; *21854*; *22162*; *26287*; *27450*; *29739*; *29911*; *30885*; *31530*; *33107*; *34212*; *38072*.

19. **Polypodium ferrugineum** Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):36, pl. 7, fig. 2. 1842.

—Type: Mexico, Oaxaca, forests of Zacatepeque and Juquila, *Galeotti 6354* (holotype BR! photo BM!; isotypes BR! K!; fragm. US).

Illustration: none, other than the rather poor original.

Rhizome 2–5 mm diam.; rhizome scales golden-tan, broad-ovate to cordate, acute, noncomose; fronds 8–25 (40) cm long, approximate to fasciculate; stipe brownish, ca 1/10 blade length, 1 mm diam. or less; blade narrow-ovate, 2–6.5 cm broad, cuneate to subtruncate at the base, lower segments strongly deflexed; rachis reddish brown, pilose, bearing scattered, linear-ovate to obovate, light tan scales; pinnae linear, 10–32 mm long, 1.5–3 mm wide, perpendicular to rachis except for lower ones, entire, symmetrically dilated at base in upper half of blade, subsymmetrical or with lower edge perpendicular to rachis in lower half of blade; costae decurrent onto rachis, dark red-brown or blackish, with scattered, acicular hairs; veins 1-forked, free; leaf tissue with scattered, clavate hairs and occasional acicular hairs; sori round, medial; sporangia with 2–4 capsular setae; spores 64 per sporangium; *n* = 37 (Nay.).

On rocks, from canyons, cliffs and river banks; rare, edges of Central Depression where it meets the S Sierra Madre and

Northern Highlands; 1000 m. Mexico (Sin., Nay., Jal., Hgo., Mlos., Méx., Cma., Gro., Oax.). Chiapas Collections: *GM 12* (DS, US); *27016A*.

20. **Polypodium fissidens** Maxon, Contr. U.S. Natl. Herb. 8:275, pl. 61, fig. 4. 1903.

—Type: Mexico, Chiapas, *Ghiesbreght 244* (holotype YU; isotypes BM! GH, K! PH! YU).

Illustration: only the original.

Rhizome ca. 5–6 mm diam., sometimes whitish, bearing lanceolate, ± spreading, bright tan, concolorous scales ca. 5 mm long; fronds arching, (10) 25–70 cm long; stipe stramineous to tan, glabrescent, ca. ⅓–⅔ blade length, 1–4 mm diam.; blade (4) 8–25 cm broad, broadest at or near base, pinnate basally, becoming deeply pinnatisect distally with a confluent pinnatifid apex; rachis hairy, without scales; pinnae (3) 7–12 mm broad with sharply serrate or biserrate margins, obtuse to acutish at apex, wholly adnate or lowermost few slightly constricted at base; veins (2) 3-forked, free; leaf tissue chartaceous, often thin, yellowish with age, with soft whitish septate hairs (especially below), veins and costae also hairy, the hairs ca. 0.4–1.0 mm long; sori round, ca. 1–2 mm diam., in single rows on both sides of costa; sporangia with a few capsular hairs ca. 0.1 mm long.

Epiphytic in Evergreen Cloud Forest, Pine-Oak-Arbutus; relatively common on higher peaks of central Plateau, s Sierra Madre; (2400) 2700–2900 m. Southern Mex. (Chis. only), Guat. Chiapas Collections: *G 244*, pt. (PH); *GM 66* (DS); *GM s.n.* (P); *JTM 1241* (US); *L&S 9857* (US); *8117*; *21996*; *22006*; *22042*; *22935*; *23021*; *26245*; *31798*; *32009*; *32061*; *32068*; *40760*.

21. **Polypodium fraternum** Schlecht. & Cham., Linnaea 5:608. 1830.

—Type: Mexico [Veracruz], near Jalapa, *Schiede & Deppe* [753].

Goniophlebium revertens Fée, Mém. Fam. Foug. 8:94. 1857. —*Polypodium revertens* (Fée) Fourn., Mex. Pl. 1:79. 1872. —Syntypes: Mexico, Veracruz, Huatusco, *Schaffner 189*; Orizaba, *Schaffner 450* (presumably P, not found).

Illustration: none found.

Rhizome ca. 1 cm diam., bearing tan, concolorous, ± appressed, ovate-lanceolate scales ca. 5 mm long; fronds 25–55 cm long; stipe stramineous to brownish, glabrous, ca. ⅓–⅔ blade length, (1) 2–4 mm diam.; blades often slightly dimorphic, the fertile with narrower and fewer pinnae than the sterile, to 40 cm broad, pinnate throughout; rachis glabrous, without scales; pinnae 5–13 (18) mm broad, entire, acute at apex, cuneate and usually petiolulate at base; veins 2–3-forked, free to somewhat anastomosing, not easily seen; leaf tissue subcoriaceous to coriaceous, completely glabrous; sori round, 1.5–2.5 mm diam., medial; sporangia glabrous; $n = 37$ (S.L.P.).

Epiphytic, occasionally on rocks, in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands, E edge of Central Plateau; 800–1700 m. Southern Mex. (Méx., S.L.P., Ver., Oax.), Bel., Guat., Hond., Nic. Chiapas Collections: *C&D 173*, *178* (US); *Z 550* (DS); *22274*; *23279*; *28981*; *37946*.

22. **Polypodium fraxinifolium** Jacq., Coll. 3:187. "1789" [1791].

—*Goniophlebium fraxinifolium* (Jacq.) Moore, Ind. Fil. lxxiv. 1857. —Type: cultivated specimen, Hort. Schönbrunn, from specimen said to have originated from Caracas (holotype W; photo BM!).

Illustrations: Vareschi, Fl. Venez. 1(2):pl. 198. 1969; Jacquin, Icon. Pl. Rar. 3:pl. 639. 1793.

Similar to *P. triseriale* but the rhizome generally narrower (ca. 5 mm diam.) and longer-creeping [(2) 4–10 cm between stipe bases]; rhizome scales appressed, rounded to slightly ovate (but never with attenuate apex); pinnae often more broadly elliptic; distal pinnae not at all or only slightly adnate; sori in 3–5 parallel rows on both sides of costa; $n = 37$ (C.R.).

Terrestrial (ours) or epiphytic in Pine-Oak-Liquidambar Forest; rare in SE corner of Central Plateau (Lagos de Monte Bello); 1300 m. Southern Mex. (Chis. only), Guat., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol., s Braz.). Chiapas Collection: *32151*.

23. **Polypodium furfuraceum** Schlecht. & Cham., Linnaea 5:607. 1830.

—Type: Mexico [Veracruz], near Jalapa, *Schiede & Deppe* [750] (isotype P!).

Polypodium nivosum Fée, Mém. Fam. Foug. 8:89. 1857. —Type: Mexico [Veracruz], Huatusco, *Schaffner 193* (presumably P, not found).

Polypodium margallii Rov., Pterid. Sur Mex. 206, pl. 38a, figs. 1–5. 1909. —Type: Mexico, Chiapas, Mesa de Coapilla, *Rovirosa 1061* (isotype PH!).

Illustrations: see under *P. margallii*; also Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 20, figs. 6–9. 1897 (as *P. macbridense* Shimek).

Rhizome 3–4 mm diam., densely clothed with appressed, lanceolate, tan, ± concolorous scales ca. 5 mm long; fronds erect to arching, 12–45 cm long; stipe with numerous whitish to tan, peltate-ovate, fimbriate scales, ca. ⅛–⅓ blade length; blade linear, ± parallel-sided, often diminishing slightly below, 12–50 mm broad, deeply pinnatisect or seemingly pinnate, apex with a confluent, usually conform segment; rachis scaly; pinnae numerous (to 60 pairs), linear, horizontal, mostly ca. 2 (3.5) mm wide, with margins entire, obtuse to subacute at tip, ± equally dilated at base or slightly more sursumcurrent than decurrent, sinus broadly rounded; veins free, 1-forked, not easily seen; leaf tissue coriaceous, bearing dense, overlapping, peltate and peltate-ovate scales below and fewer similar scales above, scales tan to often whitish or grayish, fimbriate; sori round, obscured when young by scales; sporangia glabrous.

Epiphytic or on rocks in Tropical, Lower Montane, and Montane rain forests, Pine-Oak and Pine-Oak-Liquidambar/Arbutus forests, Seasonal Evergreen Forest; common in Northern and Central plateaus, scattered in Sierra Madre and Central Depression; 300–2200 m. Southern and w Mex. (Sin., Cma., Mich., Gro., Méx., Oax., S.L.P., Hgo., Jal., Nay., Ver.), Guat., Salv., Nic., C.R., Pan. Chiapas Collections: *C&D 176* (US); *GM 67* (DS); *G 312* (BM, K); *EM 18032* (MEXU, US); *6312A*; *6369*; *6449A*; *6589*; *7882*; *21590*; *21597*; *22158*; *22161*; *22267*; *22435*, pt.; *24062*; *26027*; *26044*; *26180*; *26392*; *26599*; *27449*; *27523*; *27858*; *27913*; *32760*; *38191*; *39129*; *40051*; *40640*; *41808*; *42442*.

24. **Polypodium fuscopetiolatum** A. R. Smith, Amer. Fern J. 70:24, figs. 13–15. 1980.

—Type: Mexico, Chiapas, 6–8 km WNW of Soyalo, *Breedlove 37155* (DS).

Illustration: only the original.

Rhizome 3–6 mm diam., brownish beneath, tightly appressed, lanceolate scales; scales tan with a dark central band, minutely denticulate or papillose on margin, attenuate-filiform at tip; fronds erect to arching, (8) 25–70 cm long; stipe tan to usually castaneous (at least abaxially), glabrous or glabrescent, shining, ${}^{1}/_{4}$–${}^{3}/_{5}$ blade length, (1) 2–4 mm diam.; blade ovate-deltoid to ovate-lanceolate, (5) 8–22 cm broad, deeply pinnatisect or with lowermost 1–2 pairs of pinnae essentially free, with a confluent, subconform terminal segment to 10 cm long; rachis hairy to glabrescent, usually castaneous (at least in basal half), without scales; pinnae lanceolate, often constricted just beyond the dilated base, acute to acuminate at apex, mostly 9–15 mm broad; veins 3–4-forked, anastomosing to form a single row of areoles on each side of costa; leaf tissue chartaceous, hairy to glabrescent or nearly glabrous on both sides, veins and costae hairy; sori round, ca. 1.0–1.5 mm diam., medial or inframedial; sporangia glabrous or with a few minute setae <0.1 mm long.

Usually epipetric, occasionally epiphytic in Seasonal Evergreen Forest, occasionally Tropical Deciduous Forest, Pine-Oak Forest; common in Pacific Coastal Plain, low elevations of Sierra Madre, and w edge of Central Depression, uncommon in Northern and Central highlands adjacent to Central Depression; 500–1350 m. Southern Mex. (Méx., Mich., Gro.), Guat., Salv. CHIAPAS COLLECTIONS: *EM 17005* (MEXU, DS); *EM 18397* (MEXU, DS); *P 6755* (UC, US); *P 6858* (BM, UC, US); *P 7223* (UC); *21584*; *21593*; *21595*; *21923*; *22867*; *25616*; *26978*; *28612*; *28653*; *37155* (type); *37784*; *38135*; *38479*; *39083*; *39612*; *40067*; *40624*.

This species is closely related to *P. hispidulum* but can easily be distinguished by the narrower rhizome scales that are denticulate or papillate on the margin and filiform at the tip; also by the stipes and rachises usually castaneous and shining. There is also a relationship to *P. plesiosorum,* which has different rhizome scales and grows at much higher elevations in Chiapas.

25. **Polypodium hartwegianum** Hook. *in* Benth., Pl. Hartw. 54. 1840.

—TYPE: Mexico, "monte Sumate," 9500 ft, *Hartweg* [415] (K—2 sheets! isotypes BM! L, P!).

Polypodium ellipsoideum Fée, Mém. Fam. Foug. 7:57, pl. 21, fig. 1. 1857. —SYNTYPES: Mexico. Popocatepetl, 3000 m, *Schaffner 270*; "San Angel," *Schaffner 211* (presumably P, not found; isosyntype of *Schaffner 211* at K!).

ILLUSTRATIONS: Hooker, Icon. Pl. 4:pl. 390. 1841; Knobloch & Correll, Ferns Chih. 143. 1962; Matuda, Anales Inst. Biol. Univ. Nac. México 27:157. 1956.

Rhizome (3) 5–8 (10) mm diam., clothed with appressed to slightly spreading, ferruginous, concolorous, lanceolate scales 4–5 mm long; fronds arching to pendent, mostly 30–80 cm long; stipe stramineous to brownish with age, mostly ${}^{1}/_{3}$–${}^{1}/_{5}$ blade length, (1.0) 1.5–5 mm diam., hairy; blade mostly elliptic-lanceolate, (6) 9–15 cm broad, fully pinnate below (lower third), lowermost pinnae (3–6 pairs) somewhat shortened, adnate, blades pinnatisect upwards; rachis hairy, without scales; pinnae lanceolate, acute at tip, mostly (0.3) 0.7–1.3 cm wide; veins 1–2-forked, free; leaf tissue herbaceous, whitish-hairy on costae and veins (both sides), glabrous to sparsely hairy on leaf tissue, hairs septate, mostly 0.5–1.0 mm long; sori round to usually oblong, ca. 1.5–2.5 mm long, 1 mm broad or less, midway between costa and margin or supramedial; sporangia usually glabrous, infrequently setose, the setae 0.1 mm long or less.

Epiphytic in Evergreen Cloud Forest, rarely Montane Rain Forest; scattered on higher peaks of Central Plateau, s Sierra Madre; (2400) 2700–3000 m. Mexico (Chih., Dgo., Gro., Mich., Oax., Hgo., Méx., D.F., Mlos., Pue., Ver.), Guat., Salv. CHIAPAS COLLECTIONS: *G 208* (BM, K, PH), very atypical; *11143*; *22028*; *22044*; *22758*; *22761*; *26244*; *29436*; *31754*; *40762*; *41732*.

I regard *P. griseum* Liebm. (Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:198. 1849, not Schkuhr, 1806), type from Mexico, Puebla, Chinautla, *Liebmann* [Liebm. Pl. Mex. 2525, Fl. Mex. 125 and 715] (C! isotype K!), as a closely related, but distinct, species, differing in its very densely hairy leaf tissue (both sides), stipes, and rachises. The correct name for this species is *P. liebmannii* C. Chr.

Ghiesbreght 208 differs strikingly from all other Chiapas collections of *P. hartwegianum* in having setose sporangia, very narrow pinnae (3–6 mm broad), round or only obscurely oblong sori, and dark brown stipes. In these characters it is very close to *Schaffner 211*, a syntype of *P. ellipsoideum*. Initially, I was inclined to recognize the latter as a distinct species, but there seem to be intermediates, especially specimens from the northern part of the range (e.g., Chihuahua; see description and illustration by Knobloch and Correll). *Breedlove 40762* is also very atypical in lacking long-septate hairs and in the more linear-lanceolate, spreading rhizome scales. In all likelihood, the species is a complex, but I am unable adequately to delimit more than a single highly variable species with the material at hand.

The relationship of *P. hartwegianum* (especially the *P. ellipsoideum* element) to *P. hygrometricum* of the *plumula-pectinatum* complex seems close to me, but I can find no one who has suggested it.

26. **Polypodium hispidulum** Bartlett, Proc. Amer. Acad. Arts 43:48. 1907.

—TYPE: Guatemala, Dept. Izabal, Los Amates, *Deam 117* (GH).

ILLUSTRATION: none found.

Rhizome 2.5–4 (5) mm diam., green beneath the tightly appressed, ovate scales; scales tan to stramineous with a darker midrib, entire, often somewhat shining, obtuse to subacute at tip; fronds arching, 10–40 cm long; stipes distant, stramineous, mostly ¼–⅓ blade length, 1.0–2.5 mm diam., hairy to glabrescent; blade deltoid to deltoid-lanceolate, 6–12 cm broad, deeply pinnatisect, lowermost pinnae longest or nearly so, somewhat deflexed; rachis hairy, without scales; pinnae narrowly lanceolate from a dilated base, acute to acuminate at tip, mostly 5–12 mm broad at base; veins 3–4-forked, anastomosing to form a single row of areoles on each side of costa; leaf tissue chartaceous, thin, hairy on both sides, veins and costae also hairy, hairs 0.2–0.5 mm long; sori round, ca. 1 mm diam., midway between costa and margin; sporangia with a few capsular setae 0.1–0.3 mm long, setae often inconspicuous.

Epiphytic or on rocks in Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; relatively common in its limited range in Northern and Eastern highlands; 300–900 m. Southern Mex. (Chis. only), Guat., Hond.?, Nic.? CHIAPAS COLLECTIONS: *21872*; *22436*; *26470*; *28848*; *32822*; *32878*; *33215*; *33959*; *38245*.

Closely related to *P. fuscopetiolatum,* which see for discussion.

27. **Polypodium hygrometricum** Splitg., Tijdschr. Natuurl. Gesch. Physiol. 7:409. 1840.

—TYPE: Surinam, Para, *Splitgerber 1069* (L; photo BM! C!).

Polypodium truncatulum Rosenst., Repert. Spec. Nov. Regni Veg. 9:343. 1911. —Type: Bolivia, Antahuacana, valley of Río Espíritu Santo, *Buchtien 2168* (S; isotype US).

Illustration: Vareschi, Fl. Venez. 1(2):pl. 194. 1969.

Rhizome 3–5 mm diam.; rhizome scales lanceolate, sometimes expanded and cordate at base, ferruginous, acuminate, inconspicuously comose, nonclathrate, margins inconspicuously papillate; fronds 10–50 cm long, approximate, with stipe $^{1}/_{3}$–$^{1}/_{15}$ blade length, ca. 1.0–1.5 mm diam., dark red-brown, pilose with simple, acicular, silvery hairs, ctenoid hairs absent; blade 8–40 cm long, 2–6 cm wide, narrow-ovate to lanceolate, subtruncate to truncate at base; rachis scales absent or inconspicuous, filiform; segments 10–40 mm long, 2–5 mm wide, perpendicular to rachis or slightly ascending, narrow-ovate to linear-lanceolate, obtuse to acutish at apex, symmetrically dilated at base, entire to undulate-crenate; veins 1-forked, free; leaf tissue thin, chartaceous, with simple, silvery, acicular hairs, clavate hairs absent; costae decurrent onto rachis, brown or occasionally stramineous, pilose as on leaf tissue; sori round; sporangia with 1–5 acicular capsular setae; n = 37 (C.R.).

Epipetric, terrestrial, or epiphytic in Seasonal Evergreen Forest; uncommon, s Pacific Coastal Plain; 200–400 m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R., Pan.; S.A. (Sur. to Col. and Bol.). Chiapas Collections: *EM 18116* (MEXU, US); *EM 18392* (DS, MEXU, US); *P 7226* (UC, US); *22524*; *28505*; *28576*.

28. **Polypodium lindenianum** Kunze, Farrnkr. 2:83, pl. 134. 1851.

—Syntypes: Mexico, Chiapas, *Linden s.n.*, *Linden "5539"* [probably *1539*] (isosyntypes of both collections at P!).

Polypodium cancellatum Fée, Gen. Fil. 242. 1852. —Type: "Cuba" [probably incorrect, most likely Chiapas], *Linden s.n.* (presumably P; isotypes P—2 sheets!).

Polypodium verapax Christ, Bull. Herb. Boissier (2)5:253. 1905 (nom. nud.).

Illustrations: Fée, Mém. Fam. Foug. 6:pl. 7, fig. 2. 1853 (as *P. cancellatum*); Seymour, Phytologia 31:192. 1975.

Rhizome ca. 3 mm diam., concealed by appressed, tan, ovate scales ca. 3–5 mm long; fronds arching, (10) 25–55 cm long; stipe brown, 1.0–1.5 mm diam., covered with tan, ovate scales; blade (2.5) 5–10 cm broad, broadest at base, bipinnate-pinnatifid; rachis scaly; pinnae to 8 cm long, 8–28 mm broad, with up to ca. 8 pairs of lobed-linear pinnules, apices of pinnae and pinnules rounded; veins free, not easily visible; leaf tissue subcoriaceous, glabrous above, bearing appressed, nonoverlapping, tan scales below, these peltate with an attenuate tip; sori round, often the width of the ultimate segments or more (at maturity), obscured by peltate scales when young; sporangia glabrous.

Epiphytic in Montane Rain Forest, Pine-Oak-Liquidambar Forest; common in Northern Highlands (especially Jitotol Ridge), scattered in Eastern Highlands, n and e edges of Central Plateau, Sierra Madre; 800–2100 m. Southern Mex. (Chis. only?), Bel., Guat., Hond., Nic., C.R. Chiapas Collections: *GM 174* (DS, P); *EM 237*, *15564* (MEXU); *Li 1528* (K); *Li 1540* (K); *T&L 41723* (DS); *R 847* (K, PH); *G 257* (BM, K, PH); *P 7227* (BM, UC, US); *R&B 19971* (DS, US); *X&S X-357* (US); *15704*; *21364*; *22155*; *22237*; *22843*; *25714*; *29579*; *30165*; *32325*; *32380*; *32503*; *32620*; *32736*; *32943*; *34597*.

Closely related to *P. friedrichsthalianum* Kunze, from Costa Rica, which differs in being fully tripinnate.

29. **Polypodium longepinnulatum** Fourn., Mex. Pl. 1:77. 1872.

—Type: Mexico, Oaxaca, *Galeotti 6510* (P, photo BM!; isotype BR, photo UC!).

Polypodium biauritum Maxon, Contr. U.S. Natl. Herb. 13:9. 1909. —Type: Guatemala, Baja Verapaz, between Purulhá and Panzal, *v. Tuerckheim II 1688* (US).

Illustration: none found.

Rhizome 5–8 (10) mm diam., bearing small, brownish, concolorous ± appressed scales to 2.5 mm long, nearly as broad; fronds arching; (35) 50–90 cm long; stipe stramineous to tan, glabrous or glabrescent, half to nearly as long as blade, 2–5 mm diam.; blade deltoid-lanceolate, 13–35 cm broad, pinnate in at least lower half, with a confluent lobed or ligulate terminal segment; rachis short-hairy, tan, without scales; pinnae lanceolate to narrowly elliptic, irregularly crenulate along margin, acute at tip, mostly (8) 12–20 mm broad, lowermost fully adnate to usually at least partially free basiscopically, often with small rounded auricles above and below, upper one overlapping rachis; veins 2–4-forked, free; leaf tissue chartaceous, glabrous on both sides, veins and costae with scattered, yellowish, septate hairs to ca. 0.3 mm long (especially above); sori supramedial, usually oblong, 1.5–3.0 mm long, 1.0–1.5 mm broad; sporangia glabrous or with a few capsular setae 0.2 mm long; n = 37 (Chis.).

Terrestrial or epiphytic in Montane Rain Forest, Evergreen Cloud Forest, rarely Pine-Oak-Liquidambar Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, and s Sierra Madre; 1200–2800 m. Southern Mex. (Pue., Ver., Oax.), Guat. Chiapas Collections: *C 317* (DS); *T 1988* (DS, US); *Z 392* (DS); *G 206B* (YU); *L&S 9945* (US); *12908*; *15224*; *15360*; *21516*; *22026*; *22640*; *23182*; *23231*; *31799*; *31852*; *32062*; *32331*; *32501*; *32607*; *32662*; *34607*; *34695*.

Polypodium longepinnulatum is closely related to *P. sororium* Humb. & Bonpl. ex Willd. of the West Indies, Central America, and northern South America. I cannot be certain of the differences between them. A slightly less closely related species is *P. conterminans*, which see for discussion.

30. **Polypodium loriceum** L., Sp. Pl. 2:1086. 1753.

—*Goniophlebium loriceum* (L.) J. Smith ex Hook., Gen. Fil., sub pl. 51. 1840. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:331. 1977): Petiver, Pter. Amer. pl. 7, fig. 10 (but not fig. 12), 1712, which is redrawn from Plumier's Tract. Fil. Amer. pl. 78, 1705, illustrating a plant from Martinique.

Polypodium falcaria Kunze, Linnaea 18:316. "1844" [1845]. —Type: "in truncis arborum reg. temper. (Herb. Roemer, propr.) Coll. no. 90b. (Galeotti coll. 6336)" [Mexico, Edo. Veracruz].

Illustration: Vareschi, Fl. Venez. 1(2):pl. 204. 1969.

Rhizome 3–5 mm diam., sinuous, sometimes glaucous or white-ceraceous, bearing appressed, brownish, clathrate, roundish to ovate-lanceolate scales from a peltate base, these imbricate to distant; fronds erect or arching, (15) 30–75 (100) cm long; stipes usually tan to brownish, glabrous, to 9 cm apart, $^{1}/_{5}$–$^{2}/_{3}$ blade length, 1–4 mm diam.; blade ovate-lanceolate, 6–25 (30) cm broad, deeply pinnatisect, gradually reduced above to a confluent, pinnatifid to subentire apex; rachis glabrous or sparingly clathrate-scaly beneath; pinnae (3) 5–18 cm long, 6–15 mm broad, often falcate, acuminate at tip, adnate and sursumcurrent at base, lower ones often deflexed, slightly or not at all reduced; veins anastomosing to form 1 (2) series of areoles on both sides of costae; leaf tissue chartaceous, glabrous on both sides, costae and veins also glabrous or occasionally sparingly hairy; sori round, 1–2 mm diam., inframedial; sporangia glabrous; $n = 37$ (Jam.).

Epiphytic or infrequently terrestrial in Montane Rain Forest, Pine-Oak-Liquidambar Forest, occasionally Evergreen Cloud Forest; very common in Northern Highlands (Jitotol Ridge), Sierra Madre, and scattered localities in the Central Plateau; 1200–2700 m. Southern Mex. (Ver., Oax.), Guat., Salv., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Antill., Trin. Chiapas Collections: *G 246A* (K); *EM 2393* (K); *T&L 41418, 41422, 41692* (DS); *R 1042* (PH); *P 7224*, pt. (UC, US); *R&R&M 1226* (US); *Z 411, 429, 463* (DS); *R&B 19987* (DS, US); *15405*; *19951*; *21513*; *22341*; *22350-A*; *22637*; *22848*; *23109*; *23207*; *23230*; *24408*; *24966*; *24999-A*; *26758*; *26846*; *30130*; *31657*; *32136*; *32709*; *33519*; *33564*; *34547*; *34610*; *38811*; *41084*; *42532*; *42721*.

31. **Polypodium montigenum** Maxon, Field Mus. Nat. Hist., Bot. Ser. 17:306. 1938.

—Type: Costa Rica, Vara Blanca to La Concordia, *Maxon & Harvey 8479* (US).

Illustration: none found.

Rhizome mostly 2–4 mm diam., flattish and sulcate in drying, bearing lanceolate, closely appressed, sharply bicolorous scales 2–3 (4) mm long, these with a dark brown to blackish, percurrent midrib and broader, pale wings; fronds 25–40 (50) cm long; stipe dark purplish brown, ± shining, glabrous or with a few deciduous scales at base, usually equaling or slightly longer than blade, 1–2 mm diam.; blade deltoid, 7–14 cm broad, deeply pinnatisect with a confluent, subconform terminal segment; rachis ± glabrous with age; pinnae linear to narrowly elliptic, mostly 4–8 mm broad in middle with a usually crenate margin, acute at apex, adnate and equally dilated at base, the fertile 2–4 times their width apart; veins mostly 2–3-forked, free, not easily visible, often ending in lime-dotted hydathodes above; leaf tissue subcoriaceous, without hairs, below with scattered, nonimbricate, appressed, peltate to ovate-attenuate scales 0.5–1.0 mm long; sori round to slightly oblong, impressed, 1–2 (3) mm diam.; sporangia glabrous.

Epiphytic in Evergreen Cloud Forest, less often Montane Rain Forest, Pine-Oak-Liquidambar Forest; common in Central Plateau and s Sierra Madre, uncommon in Northern Highlands (Jitotol Ridge); 1500–3000 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan. Chiapas Collections: *G 247* (K); *Z 381* (DS); *R&R&M 1208* (US); *JTM 1242* (US); *GM 58* (DS, US); *MC 1787* (US); *T 381* (DS, US); *6663*; *12935*; *15266*; *22004*; *22667*; *22730*; *23322*; *26254*; *26784*; *29427*; *31797*; *32063*; *40330*.

This species in Chiapas nearly always occurs at higher elevations than its closest relative *P. plebeium*.

32. **Polypodium platylepis** Mett. ex Kuhn, Linnaea 36:137. 1869.

—Lectotype (chosen by Maxon, Contr. U.S. Natl. Herb. 17:563. 1916): Guatemala, *Skinner s.n.* (isolectotype K!).

Illustration: none found.

Similar, and most closely related, to *P. furfuraceum* and *P. cryptocarpon*, differing from both of these by the longer stipe (often as long as or longer than blade), blade ovate-lanceolate rather than linear, blade with a pinnatifid apex, pinnae serrulate towards tip, and fewer and wider-spaced pinnae (20–35 pairs); from *P. cryptocarpon*, it also differs in larger, more numerous scales on leaf tissue below and lower pinnae not so excised basiscopically.

Epiphytic or on rocks in Montane Rain Forest, Pine-Oak Forest, Oak-Drimys Forest; scattered in Central Plateau, s Sierra Madre; 1400–2700 m. Southern Mex. (Ver., Oax.), Guat., Nic.? Chiapas Collections: *A 1329* (UC); *P 7239* (BM, UC); *GM 52* (DS, US); *L 938* (DS); *L&S 9909* (UC, US); *G 206A* (BM, YU); *G 210*, pt. (BM); *25751*; *27695*; *32026*; *32086*; *41691*.

Polypodium platylepis does not occur with *P. cryptocarpon* in Chiapas, the latter occurring at elevations between 200–1000 m, primarily in the Northern Highlands.

33. **Polypodium plebeium** Schlecht. & Cham., Linnaea 5:607. 1830 [often spelled "plebejum"].

—*Polypodium karwinskyanum* A. Br. ex Mett., Abh. Senckenberg. Naturf. Ges. 2:66. 1856 (nom. superfl.). —Type: Mexico [Veracruz], Jalapa, *Schiede & Deppe* [*746*].

Polypodium cheilostictum Fée, Mém. Fam. Foug. 8:87. 1857. —Type: Mexico [Veracruz], Orizaba, *Schaffner 453* (presumably P, not found).

Illustration: Hooker, Garden Ferns pl. 48. 1862.

Rhizome ca. 3–6 mm diam., ropelike, bearing shaggy, divergent, lanceolate, sharply bicolorous scales ca. 2 mm long, these with a dark brown to blackish midrib and broader, light tan, crispate wings; fronds arching, 15–40 (50) cm long; stipe dark purplish brown, ± shining, glabrous, 1–1.5 times blade length, 1–3 mm diam.; blade deltoid, 6–14 cm broad, deeply pinnatisect with a confluent, hastate to subconform, terminal segment; rachis without hairs, with a few, inconspicuous scales; pinnae narrowly elliptic, mostly 4–8 mm broad in middle with a subentire to repand to crenulate margin, acute at apex, adnate and equally dilated at base; veins mostly 2–3-forked, free, not easily visible, often ending in lime-dotted hydathodes above; leaf tissue subcoriaceous, without hairs, below with a few nonimbricate, appressed, lanceolate scales 0.5–1.0 mm long; sori round, impressed, ca. 1–2 mm diam.; sporangia glabrous; $n = 37$ (Oax.).

Epiphytic in Montane Rain Forest, Pine-Oak-Liquidambar Forest; common in Northern Highlands, n Sierra Madre, se corner of Central Plateau; 1250–1600 m. Eastern and s Mex. (Tam., Hgo., S.L.P., Ver., Pue., Oax.), Guat., Hond., Salv., Nic., C.R., Pan. Chiapas Collections: *C&D 221* (US); *C&D 177* (US); *R 969* (PH); *MC 1838* (US); *P 10308* (US); *T&L 41591* (DS); *21148*; *21739*; *22372*; *25049*; *27611*; *31421*; *32125*; *32352*; *36665*; *36916*; *38793*.

34. **Polypodium plesiosorum** Kunze, Linnaea 18:313. "1844" [1845].

—*Goniophlebium plesiosorum* (Kunze) Fée, Mém. Fam. Foug. 9:24. 1857. —Syntypes: Herb. Roemer, Nos. 90 and 91, in part [presumed isosyntype: *Leibold No. 90* (P—2 sheets!)].

Polypodium confluens Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:101. 1849, not R. Br., 1810. —Type: Mexico, Puebla, Chinautla, *Liebmann* [Liebm. Pl. Mex. 2716, Fl. Mex. 695 and 696] (C! photos UC! US; isotypes BM! K!). I choose Fl. Mex. 696 as lectotype.

Goniophlebium molestum Fée, Mém. Fam. Foug. 8:92. 1857. —Type: Mexico, Veracruz, near Huatusco, Cordoba, and Orizaba, *Schaffner 180* (presumably P).

Goniophlebium anisomeron Fée, Mém. Fam. Foug. 8:93. 1857. —*Polypodium anisomeron* (Fée) Fourn., Mex. Pl. 1:81. 1872. —Syntypes: Mexico [Veracruz], Orizaba, *Schaffner 182, 458* (presumably P, not found; isosyntype of *Schaffner 182* at K!).

Polypodium anisomeron var. *elongatum* Fourn., Mex. Pl. 1:81. 1872. —SYNTYPES: Mexico, Veracruz, Ixhuatlancillo, *Bourgeau 3061* (P); Orizaba, *Schaffner s.n.* (presumably P).

Polypodium anisomeron var. *pectinatum* Fourn., Mex. Pl. 1:81. 1872. —TYPE: Mexico, Veracruz, Cordoba valley, *Bourgeau 1943* (P; isotype BR, photo US).

Polypodium feei Fourn., Mex. Pl. 1:82. 1872, not (Bory) Mett., 1857. —SYNTYPES: Mexico, *Galeotti 6412* (P); Orizaba, *Botteri & Sumichrast 1422* (MPU).

Polypodium isomeron Fourn., Mex. Pl. 1:80. 1872. —TYPE: Mexico, "pr. Teguitlan," *Hahn s.n.* (P!).

Polypodium pachyrhizon Christ, Notul. Syst. (Paris) 1:231. 1910. —SYNTYPES: Mexico, Michoacán, Barranca NW of Punguato, *Arsène 2588, 2192, 1230* (all P!). I choose *Arsène 2588* as lectotype.

Polypodium rossii Christ ex H. Ross, Acad. Nac. Ci. Antonio Alzate 32:191. 1912. —TYPE: Mexico, Morelos, Cuernavaca, Santa María, *Ross Fl. Mex. 281* (M, photo BM!).

Goniophlebium stramineum Underw. ex Conzatti, Fl. Tax. Mex. 1(2):105. 1939 (nom. nud.).

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 199. 1969.

Rhizome 3–5 mm diam., bearing ovate, tightly appressed, stramineous to tan, concolorous, sublustrous scales ca. 3–4 mm long, one-half to nearly as wide; fronds arching, (10) 15–60 cm long; stipes distant, usually stramineous, occasionally darkened, glabrous, often shining, about half to equaling blade length, 1–3 mm diam.; blade 5–18 cm broad, broadest at or just above base, pinnatisect with a confluent, pinnatifid to hastate apex; rachis glabrous or sparsely hairy below, persistently hairy adaxially, without scales; pinnae lanceolate, 5–10 (12) mm broad with margins subentire to often crenulate or serrate (especially near apex), acute at tip, adnate and ± equally dilated at base; veins 2–5-forked, lowermost veinlets regularly uniting to form a row of areoles on both sides of costa; leaf tissue chartaceous, glabrous; veins and costae below glabrous or sparsely hairy, costae above with persistent, short, tan, septate hairs; sori round, mostly 1.5–2.5 mm diam.; sporangia glabrous; $n = 37$ (S.L.P).

Epiphytic in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; common in Central Plateau, Sierra Madre, rare in Northern Highlands (Jitotol Ridge); 1500–2800 m. Southern Mex. (N.L., Pue., S.L.P., Hgo., Ver., Nay., Mich., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Ven.). CHIAPAS COLLECTIONS: *L&S 9870* (US); *MC 1569* (US); *G 413* (BM, K, PH); *G 246* (K, YU); *A 1238* (UC); *GM 62* (DS, US); *T 1993* (DS); *R 1074* (PH); *15110*; *21988*; *22036*; *23020*; *23110*; *25778*; *27696*; *28183*; *30184*; *31752*; *32005*; *32066*; *32067*; *32358*; *33522*.

Closely related to *P. rhodopleuron* but differing in the persistently hairy rachis and costae above, the generally more elongate blades, and in the usually stramineous stipes. *Polypodium plesiosorum* generally grows at higher elevations than *P. rhodopleuron*.

35. **Polypodium pleurosorum** Kunze ex Mett., Abh. Senckenberg. Naturf. Ges. 2:101, pl. 2, figs. 6, 7. 1856.

—TYPE: "Caracas. Mexico (Lind. 1518)." It is unclear whether Mettenius cited one collection or two; the reference to the Mexican collection is certainly to *Linden 1518*, collected in Chiapas "entre St. Bartolo et Pueblo Nuevo" (K! P!).

Phlebodium inaequale Moore, Gard. Chron. 1855:660, pl. 58, fig. 4. —*Goniophlebium inaequale* (Moore) J. Smith, Cult. Ferns 3. 1857. —*Polypodium inaequale* (Moore) Lowe, Ferns 2:pl. 28. 1858 (not Link, 1833). —*Polypodium guatemalense* Hook., Sp. Fil. 5:29. 1863 (not Klotzsch, 1855). —*Polypodium lowei* C. Chr., Ind. Fil. 541. 1906. —TYPE: a cultivated specimen, said to have been gathered originally in Guatemala by Loddiges [probably collected by *Skinner*] (K!).

ILLUSTRATIONS: see references cited above.

Rhizome ca. 0.7–1.2 cm diam., covered with spreading, ferruginous, ± concolorous, ovate-lanceolate scales 6–10 mm long, 2–3 mm broad, these denticulate along margin; fronds erect to arching, 40–110 cm long; stipe stramineous to tan, glabrous, ½–⅔ blade length, ca. 3–6 (8) mm diam.; blade ovate, mostly 25–40 cm broad, pinnate throughout with a conform terminal pinna; rachis glabrous, without scales; pinnae narrowly elliptic, 13–30 cm long, 1.8–3.0 (3.5) cm broad, rounded-cuneate at base, acute to acuminate at apex; veins anastomosing to form a network of 2–3 rows of areoles between costa and cartilaginous margin; leaf tissue thick-herbaceous to subcoriaceous, glabrous, veins and costae also glabrous; sori round, subcostular, large (2.0–3.5 mm diam.); sporangia glabrous.

Usually epiphytic, in Montane Rain Forest, Evergreen Cloud Forest; locally common in Northern Highlands (Jitotol Ridge), Sierra Madre, Central Plateau; 1700–3000 m. Southern Mex. (Oax.), Guat., Hond., Salv., Nic. CHIAPAS COLLECTIONS: *Li 1518* (K, P); *T 636-29* (US); *R&R&M 1215* (US); *MC 158* (US); *G 322* (YU); *Z 369, 591* (DS); *GM 84* (DS); *9067*; *15245*; *21509*; *22748*; *25373*; *29421*; *31796*; *31944*; *32428*; *32655*; *40377*; *42679*.

36. **Polypodium plumula** Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:178. 1810.

—*Ctenopteris plumula* (Humb. & Bonpl. ex Willd.) J. Smith, Hist. Fil. 185. 1875. —LECTOTYPE (chosen by Evans, Ann. Missouri Bot. Gard. 55:230. 1969): Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19655-1, photo BM!; fragm. NY).

Polypodium pulchrum Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):41, pl. 8, fig. 2. 1842. —TYPE: Mexico, Veracruz, Xalapa, *Galeotti 6332* (holotype BR! photo BM! isotypes BR—2 sheets! K! P!).

ILLUSTRATION: D. C. Eaton, Ferns N. Amer. 2:pl. 63, figs. 5–8. 1879.

Rhizome 3–7 mm diam.; rhizome scales lanceolate, acuminate, red-brown, lustrous, noncomose or occasionally comose, nonclathrate, margins regularly papillose; fronds 20–60 cm long, approximate, stipe ⅛–½ blade length, with scattered, acicular hairs, ctenoid hairs absent; rachis scales broadly cordate with short-acuminate apex, bullate or not, golden to red-brown, margins toothed or papillate; blade narrow- to linear-elliptic, 15–52 cm long, 3–8 cm wide, cuneate or occasionally subtruncate at base; segments 16–40 mm long, 2–3 mm wide, perpendicular to rachis or slightly ascending, abruptly reduced to lobes at blade base, linear, straight, obtuse, symmetrically dilated, entire, with spaces between segments one-half to equaling segment width; leaf tissue herbaceous, with scattered acicular and clavate hairs; costae decurrent onto rachis, black, occasionally brownish near rachis, with scattered, acicular hairs; veins 1 (2)-forked, free; sori medial, round; sporangia mostly with 3 or 4 two-celled capsular setae; $n = 74$ (Fla., Jam.).

Epiphytic or on rocks in Lower Montane and Montane rain forests, Seasonal Evergreen Forest; uncommon in Northern Highlands (but not Jitotol Ridge), N Central Plateau, Sierra Madre; 700–1300 m. Eastern and S Mex. (Tam., S.L.P., Ver., Hgo., Oax., Camp.), Guat., Bel., Hond., Salv., Nic., C.R., Pan.; S.A. (Sur. to Col., S to Bol., Braz.); Fla., Antill. CHIA-

PAS COLLECTIONS: *G&H 175* (MICH, not seen, cited by Evans, 1969); *6371*; *10335*; *22275*; *22428*; *32879*; *38209*; *40159*.

37. **Polypodium polypodioides** (L.) Watt, Canad. Nat. (2) 3:158. 1867.

—*Acrostichum polypodioides* L., Sp. Pl. 2:1068. 1753. —*Polypodium incanum* Swartz, Prodr. Veg. Ind. Occ. 131. 1788 (nom. nov., to be regarded as an illegitimate renaming of *A. polypodioides* L.) —*Marginaria incana* (Swartz) Presl, Tent. Pterid. 188. 1836. —*Goniophlebium incanum* (Swartz) J. Smith, J. Bot. (Hooker) 4:56. 1841. —*Marginaria polypodioides* (L.) Tidestrom, Torreya 5:171. 1905. —LECTOTYPE (chosen by Weatherby, Contr. Gray Herb. 124:28. 1939): a specimen in Herb. Plukenet, from Jamaica (BM).

Rhizome ca. 1–2 mm diam.; rhizome scales appressed, linear-subulate, with a blackish central band and hyaline margins that are usually ± fimbriate, 2.5–4 mm long, ca. 0.5 mm wide; fronds distant on rhizome, erect to pendent; stipe shorter than blades, with ovate-lanceolate peltate scales; blade oblong to triangular-oblong, deeply pinnatifid, to ca. 15 cm long, 5 cm wide, subcoriaceous, involute in drying, hygroscopic; blade segments distant, alternate to subopposite, linear to oblong, obtuse, entire, 2–5 mm wide; veins forked with secondary branches free or uniting with adjacent veins to form areoles; lower surface densely clothed with grayish scales, scales peltate, suborbicular to ovate-lanceolate, obtuse to acute or acuminate at apex, entire to strongly fimbriate, ultimately grayish with a dark brown area at point of attachment, to 1 mm long; upper surface glabrous to sparsely scaly; sori supramedial, partly imbedded, lamina embossed when viewed from above; n = 37 (S.L.P.), 74 (Jam., Trin.).

Very widely distributed, from Md. and Mo. southward through Fla., Antill., Tex., Mex., C.A., and S.A. to Bol. and N Arg. Five varieties were recognized by Weatherby (Contr. Gray Herb. 124:22–35. 1939), three of which occur in Chiapas. They may be distinguished using the following key, modified from Weatherby.

a. Scales of lower surface of blade fimbriate-serrulate; upper surface of blade bearing scattered scales; venation often almost completely goniophlebioid .... 37c. var. *polypodioides*

aa. Scales of lower surface of blade entire or only shallowly and minutely serrulate; only some veins anastomosing.

  b. Leaf tissue of upper surface glabrous; scales of lower surface prevailingly orbicular to deltoid-ovate, obtuse or acute .... 37b. var. *michauxianum*

  bb. Leaf tissue of upper surface sparsely scaly; at least some scales of lower surface, particularly the marginal, with small dilated basal portion abruptly contracted into a long, acicular tip .... 37a. var. *aciculare*

37a. **Polypodium polypodioides** var. **aciculare** Weatherby, Contr. Gray Herb. 124:33. 1939.

—TYPE: Costa Rica, San Francisco de Guadelupe, *Tonduz 8476* (GH).
ILLUSTRATION: Knobloch & Correll, Ferns Chih. 143, pl. 44, figs. 1–2. 1962.

Usually epiphytic, occasionally on rocks, in Montane Rain Forest, Pine-Oak-Liquidambar Forest, less often Pine-Oak Forest, Evergreen Cloud Forest, Seasonal Evergreen Forest; common in Central Plateau, Northern Highlands, uncommon in Sierra Madre; 900–2700 m. Mexico (Dgo., Cma., Jal., Mich., Oax., S.L.P., Ver.), Guat., Salv., Hond., Nic., C.R. CHIAPAS COLLECTIONS: *GM 53* (DS, US); *EM 4346* (MEXU); *H&S 20178* (US); *L&S 9823* (US); *JTM 1226, 1227* (US); *G 210*, pt. (PH); *A 1320, 1388* (DS, UC); *P 147* (US); *RMK 3017* (DS, UC); *T&L 41302* (DS); *21384*; *21704*; *21796*; *22122*; *22348*; *22420*; *24045*; *24905*; *25117*; *26783*; *27721*; *29297*; *32321*; *32743*; *40829*.

By far the most common variety of the species in Chiapas. According to Weatherby (op. cit.), it is derived from var. *michauxianum*.

37b. **Polypodium polypodioides** var. **michauxianum** Weatherby, Contr. Gray Herb. 124:31. 1939.

—TYPE: Virginia, Nansemond Co., Kilby, *Fernald, Long, and Fogg 4703* (GH).
ILLUSTRATION: Knobloch & Correll, Ferns Chih. 143, pl. 44, fig. 3. 1962.

Epiphytic in Lower Montane Rain Forest; rare, in Northern Highlands north of Ocozocoautla; 700–800 m. Southeastern U.S. (Md. to Ill., S to Tex., Fla.), E Mex. (Coah., Tam.), Guat. CHIAPAS COLLECTIONS: *22432*; *38192*.

37c. **Polypodium polypodioides** var. **polypodioides**

ILLUSTRATION: Vareschi, Fl. Venez. 1(2):pl. 188. 1969.

Epiphytic in Tropical Rain Forest; rare, known only from Northern Highlands; 300 m. Southern Mex. (Yuc.), Bel., Guat., Nic., C.R.; S.A. (Ven.); Antill., Bah., Trin. CHIAPAS COLLECTIONS: *G 445*, pt. (GH, K, neither seen, cited by Weatherby, op. cit.:29); *26593*.

According to Weatherby, this variety occurs only at low elevations on the continent.

38. **Polypodium ptilodon** Kunze var. **caespitosum** (Jenm.) A. M. Evans, Amer. Fern J. 58:170. 1968.

—*Polypodium pectinatum* L. var. *caespitosum* Jenm., Bull. Bot. Dept. 4:125. 1897. —TYPE: Jamaica, Old England, *Jenman s.n.* (NY).
ILLUSTRATION: Eaton, Ferns N. Amer. 1:pl. 42, figs. 1–3. 1879 [as *P. pectinatum*].

Rhizome 5–12 mm diam.; rhizome scales lanceolate, dark red-brown, lustrous, acuminate, comose, entire; fronds 30–105 cm long, approximate to fasciculate, with stipe mostly $^{1}/_{10}$–$^{1}/_{6}$ (or less) blade length, red-brown to blackish, with scattered acicular hairs to 2 mm long, ctenoid hairs conspicuous; blade narrow-elliptic, 6.5–18 cm wide, cuneate at base; rachis scales absent or inconspicuous, filiform, ± entire; segments 35–85 mm long, 4–10 mm wide, ± perpendicular to rachis, gradually reduced to lobes or auricles at blade base, acute to obtuse, symmetrically dilated at base or with lower edge perpendicular to rachis, entire; veins 1–3 (4)-forked, free; leaf tissue thick-herbaceous, with scattered silvery acicular hairs to 0.35 mm long, more densely pilose in an oblong area around sorus and with scattered clavate hairs; costae decurrent on, or perpendicular to, rachis, with ctenoid hairs and scattered acicular hairs to 2 mm long; sori round or occasionally oblong; sporangia with 1 or 2 two-celled capsular setae; spores 64 per sporangium; n = 74 (S.L.P., Ver., Jam.).

Terrestrial or on mossy tree bases, Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; scattered in Northern Highlands, NE edge of Central Plateau, cen. Sierra Madre; 700–1500 m. Eastern and s Mex. (Tam., S.L.P., Ver., Oax.), Hond., Nic.; Fla., Gr. Antill. Chiapas Collections: *C&D 250* (DS); *20964*; *21870*; *21929*; *22148*; *22181*; *23965*; *27886*; *32553*; *38033*; *38279*.

Three other varieties of *P. ptilodon* are confined to South America (Guy. and Ven. to Bol., Braz., NE Arg., Parag., Urug.).

Four collections placed here (*20964*; *21929*; *27886*; *38279*) might with equal justification be placed under *P. consimile*, which is very closely related to *P. ptilodon*. Evans has determined all of these as *P. ptilodon* var. *caespitosum*, but I am unable to find hairs on the blade around the sori, the most reliable character by which to recognize var. *caespitosum*. Three of these four collections also come from the same area as our sole collection of *P. consimile*.

Polypodium consimile var. *bourgaeanum* Fourn. (Mex. Pl. 1:76. 1872), syntypes from Mexico, Guadeloupe, and South America, is possibly the same as var. *caespitosum*, insofar as the Mexican material is concerned. The varietal epithet *bourgaeanum* has priority over var. *caespitosum*. Fournier's name was not discussed by Evans (1969).

39. **Polypodium puberulum** Schlecht. & Cham., Linnaea 5:607. 1830.

—Type: presumably Mexico, Veracruz [not stated], *Schiede & Deppe* [747] (isotype B, photo BM!).

Polypodium ehrenbergiana Klotzsch, Linnaea 20:381. 1847. —Type: Mexico, *Ehrenberg s.n.*

Polypodium olivaceum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:199. 1849. —Syntypes: Mexico. Veracruz. "inter Huatusco et Orizaba," *Liebmann* (Liebm. Pl. Mex. 2536, Fl. Mex. 128] (C!); "Sta Maria Alpatlahua," *Liebmann* [Liebm. Pl. Mex. 2535, Fl. Mex. 127] (C! photo K!). I choose Fl. Mex. 128 as lectotype.

Polypodium olivaceum var. *elatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:199. 1849. —Type: Mexico, Veracruz, "Hac. de Mirador," *Liebmann* [Liebm. Pl. Mex. 2537, Fl. Mex. 126] (C!).

Illustration: none found.

Rhizome 5–8 mm diam., bearing orangish-tan, lanceolate-attenuate scales from a broadened base, scales ± spreading, concolorous, glabrous, ca. 5 mm long; fronds (15) 30–85 cm long, stipe one-third to nearly equaling blade; stipe 1–4 mm diam., stramineous to tan, pubescent; blade (4) 10–22 cm broad, lower few pairs of pinnae ± of equal length or slightly shortened, blade pinnate at least in lower third, pinnae sessile, slightly constricted or adnate their width, not dilated, more distal pinnae becoming slightly dilated, ultimately confluent, with a lobed to subentire confluent apex; rachis hairy, without scales; pinnae (2) 5–12 cm long, ca. (5) 10 mm broad, entire to faintly crenulate, obtuse to acutish at apex; veins 2–3-forked, free; leaf tissue dark olive-green, thick-herbaceous, with rather dense, lax, septate hairs mostly 0.5–1.0 mm long on both surfaces and veins; sori round, medial, 1.5–2.5 mm diam., in single rows on both sides of costa; sporangia glabrous or with a few minute hairs <0.1 mm long on capsule.

Epiphytic in Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; rare, Central Plateau; 1600–2300 m. Southern Mex. (Ver., Oax.). Chiapas Collections: *9411*; *33516*; *34803*.

Another probable synonym is *P. fournieri* C. Chr. (nom. nov. for *P. pubescens* Fée, non L., Mém. Fam. Foug. 8:87. 1857. Type from Mexico [Veracruz], Huatusco, Dos-Puentes, *Schaffner 181*, (presumably P, not found).

A chromosome report for this species by Evans (Caryologia 16:676. 1963) was based upon a specimen that I regard as *P. plesiosorum* Kunze (U.C. Bot. Gard. Acc. 57-420-1).

40. **Polypodium pyrrholepis** (Fée) Maxon, Contr. U.S. Natl. Herb. 17:593. 1916.

—*Goniophlebium pyrrholepis* Fée, Mém. Fam. Foug. 8:94. 1857. —Type: Mexico [Veracruz], Huatusco, *Schaffner 197* (presumably P, not found).

Illustrations: details of scales and venation in Sota (1966).

Rhizome ca. 3–5 mm diam., with numerous knobby phyllopodia; rhizome scales abruptly attenuate from an orbicular to ovate base, patent, 2.5–4.5 mm long, concolorous to weakly bicolorous with a darkened central portion and a lighter margin, in mass appearing ferruginous; fronds 25–80 cm long; stipe $^{1}/_{7}$–$^{1}/_{2}$ blade length, 2–3 mm diam., with dense, spreading scales; blade oblong-lanceolate, (2.5) 4–12 cm broad, deeply pinnatisect with a confluent, subconform, terminal segment, lowermost 1–5 pairs of pinnae somewhat reduced; rachis scaly; pinnae linear-oblong, 3–6 mm broad, entire, rounded to acutish at tip, ± equally dilated at base; veins anastomosing to form a single row of areoles on both sides of costa, not easily seen; leaf tissue subcoriaceous, lower surface with usually contiguous or densely imbricate scales, base rounded and fimbriate, apex abruptly attenuate, filiform, upper surface with scattered scales similar to those of lower surface but more delicate, hyaline, with apex not so abruptly attenuate; sori round, medial; sporangia glabrous; $n = 37$ (Ver., Oax.).

Epiphytic in Lower Montane and Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest, infrequently Tropical Deciduous Forest; relatively common in Northern Highlands (but not Jitotol Ridge), rare in N Sierra Madre, N edge of Central Plateau; 550–900 (1400) m. Southern Mex. (Ver., Oax.). Chiapas Collections: *G 210*, pt. (PH); *10340*; *21867*; *21970*; *22157*; *23391*; *25139*; *28161*; *32846*; *32884*; *38212*.

Two collections seem to be more or less intermediate morphologically between *P. pyrrholepis* and *P. sanctae-rosae*: *Breedlove 25504* and *34569*. Both of these collections were made in the northern edge of the Central Plateau, at elevations of 1000 and 1200 m, respectively. This is perhaps the only area in the state where the two species might grow together. Ordinarily, *P. sanctae-rosae* occurs at much higher elevations than *P. pyrrholepis*.

41. **Polypodium remotum** Desv., Mém. Soc. Linn. Paris 6:232. 1827.

—Type: "habitat in America calidiori," collector not stated (P! photo BM!).

Polypodium leucosticton Kunze ex Klotzsch, Linnaea 20:380. 1847. —Syntypes: Venezuela, *Hartweg 1499* and *Moritz 336* (BM—2 sheets!).

Illustration: none found.

Rhizome ca. 5 mm diam., bearing lanceolate, closely appressed, sharply bicolorous scales like those of *P. montigenum*, the rhizome often obscured by a dense mass of felt-haired roots; fronds 50–70 cm long (ours); stipe purplish brown, with scattered, persistent, lanceolate scales, ca. ⅓ (sterile) to ½ (fertile) blade length, 2–3 mm diam., alate much of its length; blade lanceolate, 8–16 cm broad, deeply pinnatisect, gradually reduced distally to a pinnatifid or lobed apex; rachis often reddish, narrowly winged throughout, with scattered, persistent, linear-lanceolate scales; pinnae ca. 30 pairs, linear, mostly 5–10 mm broad with an entire to slightly undulate margin, obtuse to acutish at apex, adnate and equally dilated at base, 1–2 times their width apart; veins mostly 2-forked, free, not easily visible, often ending in lime-dotted hydathodes above; leaf tissue thick-herbaceous to subcoriaceous, without hairs, below with a few nonimbricate, linear-lanceolate, appressed scales 0.5–1.5 mm long, these most numerous along costae; sori round to slightly oblong, ca. 1–2 mm diam.; sporangia glabrous.

Epipetric or epiphytic in Montane Rain Forest; rare in Northern Highlands (Jitotol Ridge); 1700 m. Southern Mex. (Chis. only), Guat., Nic., C.R.; S.A. (Col., Ven., and perhaps s to Bol.). CHIAPAS COLLECTIONS: *G 400* (BM, PH); *26080*; *32673*.

Chiapas specimens are not so dimorphic as specimens I have seen from South America but are otherwise similar. In Chiapas, this species occupies a habitat that is peculiar in *Polypodium*: on wet rocks adjacent to and even within streams. This does not appear to be the habitat of the species elsewhere in the range. Another peculiarity is that the spores of this species often germinate while still inside the sporangia and thus appear green. I have seen this feature on *Breedlove 26080* and also on several Costa Rican specimens.

42. **Polypodium rhachipterygium** Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:191. 1849.

—*Goniophlebium rhachipterygium* (Liebm.) Moore, Ind. Fil. 396. 1862. —TYPE: Mexico, Oaxaca, Chinantla, Teotalcingo, *Liebmann* [Liebm. Pl. Mex. 2569, Fl. Mex. 160 and 161] (C!). I choose the fertile specimen, Fl. Mex. 160, as lectotype; isotype BM!

Polypodium stenoloma D. C. Eaton, Proc. Amer. Acad. Arts 8:618. 1873. —TYPE: Mexico, Chiapas, *Ghiesbreght 386* (YU; isotype K!).

Polypodium donnell-smithii Christ, Bull. Herb. Boissier (2)6:291. 1906. —TYPE: Guatemala, Alta Verapaz, *von Türckheim s.n.* [*Donn.-Smith 8823*] ("herb. Donnell Smith"—US).

ILLUSTRATION: Maxon, Contr. U.S. Natl. Herb. 16:pl. 34. 1912.

Rhizome ca. 8 mm diam., bearing ± appressed, tan, concolorous, ovate scales 2–3 mm long; fronds arching, 50–100 cm long; stipe brownish to purplish, dull, glabrous, ca. ⅓–½ blade length, ca. 3 mm diam.; blade ca. 15–32 cm broad, pinnate to deeply pinnatisect at base, all pinnae adnate, upper ones dilated at base, tip of blade confluent, pinnatifid or subhastate; rachis glabrous, winged nearly or quite to base; pinnae (6) 10–20 pairs, separated by very broad sinuses (to twice pinna width), 1.6–2.5 cm broad, margins entire to slightly repand; veins 2–3-forked, free to casually anastomosing to form a large areole, veinlets distant; leaf tissue dark green, thin, chartaceous, glabrous on both sides or costae below with a few minute hairs; sori oblong, 1.5–3 mm long, in single rows on both sides of costa; sporangia glabrous.

Presumably epiphytic, probably in lower-elevation rain forests; rare, s Sierra Madre. Southern Mex. (Oax.), Guat., Hond. CHIAPAS COLLECTIONS: *P 6753* (UC); *P 6871* (UC, US); *P 7224*, pt. (UC).

Chiapas specimens have mostly free venation but with occasional casual anastomoses. The type of *P. rhachipterygium* was described as often having a single row of large areoles on both sides of the costae.

Polypodium rhachipterygium is most closely related to *P. longepinnulatum*, *P. conterminans*, and *P. dissimile*, all of these species having free or nearly free veins, oblong sori, and small, appressed rhizome scales.

43. **Polypodium rhodopleuron** Kunze, Linnaea 18:315. "1844" [1845].

—SYNTYPES: Mexico, Veracruz, Xalapa, *Schiede & Deppe* [745]; Herb. Roemer, no. 91, pt. (probable isosyntype of *Schiede & Deppe* collection at P!).

Polypodium vanheurckii Fourn., Mex. Pl. 1:82. 1872. —SYNTYPES: Mexico. "in regione Orizabensi, pr. Escamela," *Botteri 1471* in Herb. Van Heurck (isosyntype P!); "San Andres," *Botteri 1473* in Herb. Van Heurck.

ILLUSTRATION: none found.

Rhizome (2.5) 3–5 (6) mm diam., greenish beneath the appressed, ovate, tan, ± shining scales; fronds (10) 15–50 cm long, with stipe $^1/_5$–$^1/_3$ ($^1/_2$) blade length, glabrous, pinkish to reddish brown (stramineous to pinkish when young), 1–2 mm diam.; blade linear-lanceolate to deltoid, to 15 cm broad, deeply pinnatisect; pinnae to ca. 30 pairs per frond, to 1.2 cm broad, middle ones equally sursumcurrent and decurrent, fully adnate, lowermost ones somewhat narrowed at base, sursumcurrent above and excavate basiscopically, tapering evenly to an acute tip, entire to regularly notched toward tip; veins anastomosing, forming a single row of areoles on both sides of costa, often pinkish below; leaf tissue chartaceous, perfectly glabrous on both sides (costae and rachis included); sori round, 1–2 mm diam.; sporangia glabrous; n = ca. 37 (Ver.).

Epiphytic in Lower Montane and Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; common in Northern Highlands and E edge of Central Plateau, uncommon in Sierra Madre, Eastern Highlands; 800–1600 (1900) m. Southern Mex. (Oax., Ver.), Guat., Hond., Nic., C.R. CHIAPAS COLLECTIONS: *R 1051* (PH); *H&S 20182* (US); *R&R&M 1130* (US); *20283*; *21647*; *21883*; *22160*; *22296*; *22373*; *22672*; *27920*; *30799*; *31325*; *31500*; *31432*; *32142*; *32197*; *32498*; *32676*; *32938*; *36667*; *38949*.

Chiapas specimens tend to have reddish-brown (rather than pinkish) axes but otherwise are typical for the species. A very few specimens are somewhat intermediate between this species and *P. plesiosorum*, which see for discussion.

44. **Polypodium sanctae-rosae** (Maxon) C. Chr., Ind. Fil. Suppl. 1. 62. 1913.

—*Goniophlebium sanctae-rosae* Maxon, Contr. U.S. Natl. Herb. 13:8. 1909. —TYPE: Guatemala, Baja Verapaz, near Santa Rosa, *von Türckheim II. 1607* (US; isotypes F, MO, NY, P! US).

ILLUSTRATION: details of scales in Sota (1966).

Rhizome 3–6 mm diam., with knobby phyllopodia; rhizome scales imbricate, suborbicular to ovate-lanceolate, appressed, bicolorous with blackish centers and lighter fimbriate margins, 1–2 mm long; fronds 25–75 cm long, stipe mostly ⅓–⅔ blade length, 2–3 mm diam., with scales similar to those of rhizome but somewhat longer, tawny, attenuate, deeply fimbriate, a few scales blackish; blade deltoid-lanceolate, (5) 8–17 cm broad, deeply pinnatisect with a confluent, subconform apex 1–6 cm long, lowermost pinnae longest or nearly so; rachis with scales like those of stipe; pinnae 14–40 pairs, linear-lanceolate, 4–7 (9) mm broad, entire, acute to acuminate at tip, adnate at base, lowermost pinnae a little sursumcurrent, slightly excised below; veins anastomosing to form a single series of areoles on both sides of costa, not easily seen; leaf tissue subcoriaceous, densely covered with appressed, imbricate, tawny scales, these very long-attenuate from a small subovate, fimbriate, darker-centered base, concealing the leaf tissue, becoming grayish with age; upper surface with similar scattered scales; sori round, inframedial to medial; sporangia glabrous; n = 37 (Oax.).

Epiphytic in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-Liquidambar/Arbutus forests, rarely Lower Montane Rain Forest; common in Central Plateau, less common in Northern Highlands, Sierra Madre; (800) 1250–2700 m. Southern Mex. (Jal., Oax.), Guat., Salv., Hond., Nic. Chiapas Collections: *Z 566* (DS); *T&L 41200* (DS); *GM 51* (US, DS); *GM 76* (US, DS); *A 1237* (UC); *L&S 9825* (UC); *G 210*, pt. (BM, K); *7331*; *21706*; *21735*; *22999*; *26834*; *27189*; *27548*; *27714*; *28722*; *32094*; *32710*; *37269*; *38211*; *40828*; *41381*; *41668*; *42037*.

A few specimens are intermediate between this species and *P. pyrrholepis,* which see for discussion. The sole collection from the southern Sierra Madre (*41668*) is very atypical in having small narrow blades that are much more densely scale-covered.

45. **Polypodium thyssanolepis** A. Br. ex Klotzsch, Linnaea 20:392. 1847.

—*Goniophlebium thyssanolepis* (Klotzsch) Moore, Ind. Fil. 396. 1862. —Syntypes: Colombia, *Moritz 22* and *E. Otto 896* (isosyntypes of both collections at P!).

Polypodium incanum Swartz var. *fimbriatum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):36. 1842. —Lectotype (chosen by Morton, Contr. U.S. Natl. Herb. 38:257. 1973): Mexico, Jalisco, "Barranca de Guadalajara," *Galeotti 6438* (BR! isolectotypes BR! P!).

Polypodium rhagadiolepis Fée, Gen. Fil. 237. 1852. —*Goniophlebium rhagadiolepis* (Fée) Fée, Mém. Fam. Foug. 7:62, pl. 19, fig. 3. 1857. —Type: "insula Cuba et in Mexico." Fée cited only *Linden s.n.*, Yerba Buena [Chiapas] (presumably P); *Linden s.n.* (P!), "forets de Pino de Yerba Buena" is probable type material.

Illustrations: Knobloch & Correll, Ferns Chih. 141. 1962; Vareschi, Fl. Venez. 1(2):pl. 193. 1969.

Rhizome 3–5 mm diam.; rhizome scales lanceolate, appressed, imbricate, brown with a central blackish stripe, ca. 3 mm long; fronds arising at intervals of 5–15 mm, extremely variable in size, 5–45 (60) cm long, with stipe (0.5) 1–2.5 times as long as blade, 1–2 (3) mm diam., scaly, scales brown to tawny or whitish, orbicular to lanceolate, ciliate; blade ovate to lanceolate, deeply pinnatisect, 5–30 cm long, 3–13 cm wide; pinnae 4–12 (20) pairs, distant, to 1.2 cm wide, linear to oblong to spathulate, obtuse to acutish at apex, entire to undulate, sursumcurrent, excavate below; leaf tissue subcoriaceous, lower surface with persistent, brown to pale tawny or whitish imbricate scales, these ovate-lanceolate, acuminate, 1.5–3 mm long, margins toothed or copiously ciliate, dark brown in center; upper surface glabrous to sparingly scaly; sori in a single row on both sides of costa, round, partially concealed by scales; sporangia glabrous; n = ca. 74 (Sin.), 37 (Peru); $2n$ = ca. 148 (Jam.).

On rocks or rocky slopes in or adjacent to Lower Montane Rain Forest, Seasonal Evergreen Forest, Tropical Deciduous Forest, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Evergreen Cloud Forest, and secondary growth; common in Central Plateau, uncommon in Northern Highlands, edge of Central Depression; (700) 1000–2200 (2700) m. Widespread, from Ariz. and w Tex. s nearly throughout Mex., Guat., Hond., Nic., C.R.; S.A. (Ven. to Bol.); Jam., Hisp. Chiapas Collections: *R&R 2051* (MEXU, US); *EM 5814* (MEXU, US); *L&S 9905* (US); *GM 53a* (US); *A 1294* (UC); *G 210* (K); *Li s.n.* (P); *JTM 1216* (US); *6131*; *9378*; *13147*; *21547*; *22422*; *22433*; *22918*; *26037*; *26155*; *26835*; *26837*; *26964*; *27140*; *28686*; *36529*; *37162*; *37947*; *39110*; *40631*; *40740*; *41784*; *41810*; *42405*.

46. **Polypodium triseriale** Swartz, J. Bot. (Schrader) 1800(2):26. "1801" [1802].

—Type: collector and locality not stated.

Polypodium brasiliense Poir., Encycl. Méth. 5:525. 1804. —Type: Brazil, collector not stated (Herb. Lamarck & Desfontaines—P; possible isotype B—Herb. Willd. 19687).

Polypodium neriifolium Schkuhr. Kr. Gew. 1:14, pl. 15. 1806. —*Goniophlebium neriifolium* (Schkuhr) Hook., Gen. Fil. pl. 70B. 1841. —Type: locality not stated, "Ex Herbar. Breynii."

Polypodium menisciifolium Langsd. & Fisch., Icon. Fil. 11, pl. 12. 1810. —Type: Brazil, "insula St. Catharinae," *Langsdorff s.n.* (isotype B—Herb. Willd. 19670, photo BM!).

Illustration: Rovirosa, Pterid. Sur Mex. pl. 42. 1909.

Rhizome ca. 6–15 mm diam., bearing ± appressed to spreading (at apex), brownish, subclathrate scales, these ca. 5 mm long, attenuate at apex from a peltate base ca. 3 mm broad; fronds erect or arching, (8) 25–130 cm long; stipe stramineous to usually tan or brown, glabrous, two-fifths to nearly as long as blade, (1) 2–7 mm diam.; blade (4) 12–70 cm broad, pinnate throughout, with a conform terminal pinna; rachis glabrous, without scales; pinnae (2) 6–35 cm long, (7) 15–35 mm broad, ± entire, acute at tip, rounded to cuneate at base, those of upper half of blade increasingly adnate; veins anastomosing into a regular series of 3–5 (6) rows of areoles on both sides of costa, main lateral veins producing veinlets that unite and give rise to an excurrent free veinlet (occasionally 2 per areole); leaf tissue chartaceous to subcoriaceous, glabrous on both sides; sori round, 1.0–2.5 mm diam., in 1–3 parallel rows on both sides of costa, at ends of excurrent free veins; sporangia glabrous; n = 37 (Oax.), n = 74 (Jam.).

Usually epiphytic or on rocks in Lower Montane and Montane rain forests, Pine-Oak Forest, Seasonal Evergreen Forest, and Tropical Deciduous Forest; common in Northern Highlands (but not known from Jitotol Ridge), uncommon and widely scattered in Eastern Highlands and lower elevations of Sierra Madre; 200–1000 (1500) m. Southern Mex. (Tab., Ver., Oax.), Guat., Salv., Hond., Nic., C.R.; S.A. (Col. to Bol. and Fr. Gui., Braz.); Antill., Trin. Chiapas Collections: *R 861* (PH); *EM 18028* (DS, MEXU); *P 6757* (UC, US); *R&R&M 1404* (US); *C&D 171, 173* (US); *21845*; *21847*; *21896*; *21944*; *22446*; *22566*; *27099*; *28484*; *28921*; *31482*; *32792*; *32868*; *32881*; *32962*; *33254*; *38075*; *38216*; *40120*.

Species to Be Looked for in Chiapas

Polypodium aequale Maxon —known only from Guat.; apparently related to *P. adelphum* but affinities uncertain because of paucity of material. Type is *Heyde & Lux s.n.* (ed. Donn.-Smith 3263B), from Dept. Quiché, San Miguel Uspantán (US).

Polypodium arcanum Maxon [nom. nov. for *P. deltoideum* Liebm., not Swartz] —Oax., Pue.; very closely related to *P. eatonii,* which see. The type is from Edo. Puebla, Chinautla, *Liebmann* [Liebm. Pl. Mex. 2598, Fl. Mex. 155 and 156] (C! isotypes K—2 sheets!).

Polypodium guilleminianum Fourn. —type from Mexico, San Rafael, *Guillemin s.n.* (P! photo BM!). Probably the same as *P. subpetiolatum* Hook.

Polypodium hahnii Fourn. —Type from Mexico [Veracruz], Misantla, *Hahn s.n.* (P!). Probably the same as *P. subpetiolatum* Hook.

Polypodium lepidotrichum (Fée) Maxon —known only from a small area in Hgo. and Ver. This species has the aspect of *P. collinsii* but can be distinguished by its dense, spreading, filiform, woolly, orangish, concolorous stipe base and rhizome apex scales.

Polypodium lesourdianum Fourn. —Type from Mexico, Orizaba, "Bott. and Sum. n. 1471 in herb. LeSourd." Possibly the same as *P. rhodopleuron*; type material not seen.

Polypodium liebmannii C. Chr. [nom. nov. for *P. griseum* Liebm., not Schkuhr] —Pue., Guat.; closely related to *P. hartwegianum*, which see for discussion.

Polypodium maxonii C. Chr. [nom. nov. for *P. firmulum* Maxon] —Type from Mexico, San Luis Potosí, Alvarez, *E. Palmer 448* (US). Closely related to *P. adelphum* and *P. subpetiolatum*.

Polypodium madrense J. Smith —Sin., Dgo., Hgo., Mich., Méx., Mlos., Oax., Pue. Related to *P. plebeium*, differing by its narrower, ± parallel-sided segments and somewhat scalier leaf tissue below.

Polypodium martensii Mett. [nom. nov. for *P. affine* Mart. & Gal., not Forst., 1786, not Blume, 1829; heterotypic synonym is *P. callolepis* Fée]. —Jal., Méx., S.L.P., Ver., Pue., Oax. Distinguished by the dense, spreading, lanceolate, twisted scales on the rhizome, linear blades with lowermost segments reduced, pinnae rounded at tip, free veins, and long-pilose sporangia.

Polypodium rosei Maxon —Sin., Jal., Méx., Mich., Gro., Mlos. Closely related to *P. pyrrholepis*, but distinguished by its larger, flaccid, concolorous, tan, rhizome scales (more than 5 mm).

Polypodium subpetiolatum Hook. (syn. *P. biserratum* Mart. & Gal.) —Chih., Cma., Jal., Mich., D.F., Méx., Pue., Oax. Closely related to *P. echinolepis* and *P. adelphum* but distinguished by the biserrate pinna margins, rhizome scales not densely glandular.

Polypodium sursumcurrens Copel. —Ver., Pue. Apparently related to *P. alfredii* of the *plumula-pectinatum* complex, differing by its numerous short, clavate, blackish hairs on the leaf tissue below (because of uniform attack by pyrenomycete fungus), by the spaces between segments 2–3 times segment width, and by the presence of twisted multicellular paraphyses with a clavate head.

86. POLYSTICHUM

Polystichum Roth, Tent. Fl. Germ. 3:31, 69. 1799, emend. Schott, Gen. Fil. pl. 9. 1834. —Lectotype (as chosen by Schott, loc. cit.): *Polystichum lonchitis* (L.) Roth [≡*Polypodium lonchitis* L.]. See Pichi-Sermolli (Webbia 9:436. 1953) for discussion of typification.

Plants terrestrial; rhizome usually suberect to erect, short, often stout, scaly; stipes commonly clustered, with numerous vascular bundles in cross section, commonly densely scaly (at least at base); blade simply-pinnate to decompound (rarely simple), anadromous; rachis in many species (but only 1 of ours) with scaly bud(s), either at blade apex or in axils of pinnae; ultimate divisions spinulose or mucronate at margins (especially at tip and acroscopic margin); leaf tissue commonly subcoriaceous to coriaceous, fibrillose-scaly on axes, veins, and sometimes leaf tissue below; veins free; sori dorsal on veins, round, commonly with a peltate indusium, or indusium wanting in relatively few species; spores bilateral, monolete, with an echinulate or tuberculate perispore; $x = 41$.

According to Copeland (1947), *Polystichum* comprises 175 or more species, but the exact number is very uncertain because of the difficulty in circumscribing species and the lack of monographic work in the genus. *Polystichum* is subcosmopolitan, with species in both temperate regions and higher elevations in the tropics. However, a significant number of species is also found at lower and middle elevations in the tropics. The number of New World species is probably about 75. Centers of diversity are Cuba-Jamaica-Hispaniola (ca. 27 species, only one of which grows in Chiapas), southern Mexico (ca. 13 species), Andean South America, and southern Brazil. There are about twelve species in United States and Canada. A very large concentration of species occurs in the Sino-Himalayan region (21 species recorded from Japan; Ohwi, Flora of Japan. 1965).

Several Mexican species are most difficult to define. Those that are most easily circumscribed are *P. platyphyllum* and *P. mickelii* (low to middle elevations), and *P. furfuraceum, P. erythrosorum, P. polyphyllum,* and *P. munchii* (high elevations). Somewhat less easy to characterize are *P. distans* and *P. muricatum*. Then there is what I shall call the *P. hartwegii* complex, consisting of several closely related species. *Polystichum ordinatum, P. rachichlaena, P. fournieri,* and *P. drepanoides* all seem to be derived from *P. hartwegii*, and with the exception of *P. fournieri* and possibly *P. hartwegii* they have relatively restricted distributions. I have studied a considerable amount of material from elsewhere in Mexico while attempting to understand these plants and determine their ranges. I consider the treatment below to be only a beginning, subject to modification after more intensive field studies and (judging from the polyploidy and hybridization known in temperate species of *Polystichum*) also cytological studies. The best characters that I have found for characterizing species concern the morphology of scales of the rhizome apex and stipe base, indusial presence/absence (also size and color), and cutting of pinnules. The last-named is, however, rather variable within a species, so caution must be used. Elevational range can also be very useful.

a. Blade simply pinnate, pinnae shallowly toothed or lobed, less than 3 cm long .... 8. *P. munchii*

aa. Blade bipinnate or more divided.

b. Indusia absent; stipe base scales broadly ovate.

c. Bud in axil of distal pinna; stipe base scales concolorous; low to middle elevation (800–1600 m) .... 11. *P. platyphyllum*

cc. Buds lacking; stipe base scales concolorous to bicolorous; low to high elevation.

d. Blade linear-lanceolate; pinnae 2–4 cm long; sori confluent at maturity; pinnules sparingly or not at all spinulose, margin strongly inrolled; very high elevation (3600–4200 m) .... 12. *P. polyphyllum*

dd. Blade ovate-attenuate; pinnae 6–18 cm long; sori discrete at maturity; pinnules spinulose at tip and sometimes margins, margin not strongly inrolled; low to middle elevation (800–2500 m) .... 7. *P. mickelii*

bb. Indusia present, fugacious in several species; stipe base scales ovate to linear-lanceolate.

e. Stipe base with numerous ovate-lanceolate scales 1–3 cm long, to 6 mm broad, these black and shining, or black with very narrow, light brown margins; rachis with a few smaller blackish scales; stipe ca. $^{1}/_{5}$–$^{1}/_{2}$ blade length; lamina coriaceous; high elevation (2400–3000 m) .... 1. *P. distans*

ee. Stipe base scales dark to light brown (some black and shining in *P. erythrosorum*), ovate-lanceolate to linear-lanceolate; rachis without blackish scales; stipe mostly more than one-half blade length (but see *P. ordinatum*); middle to high elevation.

f. Stipe and rachis scales strongly spinulose, teeth to 0.4 mm long; pinnules auriculate but otherwise entire, margin spinulose, especially near tip; stipe and rachis scales very dense, brown, concolorous; high elevation (ca. 2800 m) .... 5. *P. furfuraceum*

ff. Stipe and rachis scales inconspicuously dentate or entire; pinnules toothed, pinnatisect, or entire; stipe and rachis scales moderately dense to sparse, brown, concolorous or bicolorous with lighter margins; middle to high elevation.

g. Indusia reddish brown; pinnules ± entire or acroscopically auriculate; some stipe base scales black and lustrous; high elevation (2800–3000 m) .... 3. *P. erythrosorum*

gg. Indusia whitish to tan to brown; pinnules ± entire to pinnatisect; stipe base scales dark to light brown; middle to high elevation.

h. Indusia large (1 mm or more in diam.), persistent.

i. Plants small, pinnae less than 8 (10) cm long; lowermost pinnae often strongly deflexed; pinnae fewer than 20 pairs per frond; stipe base scales linear-lanceolate, mostly bicolorous .... 4. *P. fournieri*

ii. Plants larger, with pinnae mostly greater than 10 cm long: lowermost pinnae not usually strongly deflexed (but see *P. ordinatum*); pinnae usually more than 20 pairs per frond; stipe base scales linear-lanceolate to ovate-lanceolate, concolorous to bicolorous.

j. Pinnules deeply incised or toothed, an acroscopic lobe nearly free .... 6. *P. hartwegii*

jj. Pinnules merely dentate or auriculate, without free lobes.

k. Pinnae very large, mostly 15–30 cm long, 3–5 cm wide; stipe base scales linear-lanceolate, bicolorous .... 2. *P. drepanoides*

kk. Pinnae smaller, 7–14 cm long, mostly 2–3 cm broad; stipe base scales ovate to lanceolate, concolorous to weakly bicolorous .... 13. *P. rachichlaena*

hh. Indusia smaller, often not persisting, or hidden by mature sporangia.

l. Stipe base scales concolorous, light brown, broadly ovate (to 6 mm broad) .... 9. *P. muricatum*

ll. Stipe base scales bicolorous, with a dark brown central stripe and lighter brown to stramineous margins, linear-lanceolate (mostly 1–2 mm broad).

m. Lowermost several pairs (5–8) of pinnae reduced to 0.3–0.6 times length of longest pinnae; stipe base scales discordantly bicolorous .... 10. *P. ordinatum*

mm. Lowermost several pairs of pinnae not reduced or basal pinnae only slightly reduced; stipe base scales not sharply bicolorous .... 6. *P. hartwegii*

1. **Polystichum distans** Fourn., Mex. Pl. 1:91. 1872.

—TYPE: Mexico, Orizaba, *Schaffner 217a* (not found at P or K).

Polystichum pallidum Fourn., Mex. Pl. 1:91. 1872 (not Gardner, 1842, nor Todaro, 1866). —TYPE: Mexico, Oaxaca, *Ghiesbreght s.n.* (P; photo US!).

ILLUSTRATION: none found.

Rhizome stout, erect, caudex to 8 cm diam., rarely collected because of its size; fronds mostly 40–100 cm long, with stipes $^{1}/_{5}$–$^{1}/_{2}$ blade length, base with very dense, ovate-lanceolate, bicolorous scales, these with a broad black shiny center and very narrow tan margins, mostly 1–3 cm long, to 6 mm broad, distally the stipe usually copiously scaly, scales mostly brown or with narrow blackish central stripe; blade ovate-lanceolate, bipinnate, 9–20 (30) cm broad, rachis copiously scaly, scales mostly brown but a few blackish or tinged with black; pinnae 20–40 pairs, lanceolate, mostly 1–2 (2.5) cm broad, lowermost several pairs often slightly reduced; pinnules ± entire with a small acroscopic auricle, or basal ones of larger pinnae deeply incised, acute to blunt, spinulose at tip and sometimes both margins, margins often somewhat inrolled; costae, veins, and leaf tissue below fibrillose-scaly; leaf tissue coriaceous; indusia small, brownish, often early-fugacious and so not seen; sori confluent at maturity; $n = 41$ (Chis.).

In *Quercus-Drimys* Forest, Evergreen Cloud Forest; locally common on Cerro Huitepec in Central Plateau, elsewhere uncommon in Central Plateau, s Sierra Madre; 2400–3000 m. Higher peaks of s Mex. (Jal.?, Méx.?, Hgo., Ver., Pue., Oax.). Chiapas Collections: *G 217* (BM, K, NY, PH); *GM 41* (DS); *L&S 9848* (K, US); *L&S 9850* (UC, US); *La 159* (DS); *MC 1567* (US); *9270*; *22766*; *23003*; *25296*; *26275*; *27216*; *27220*; *32082*.

This is a relatively distinct species in Chiapas, distinguished from all others by the shiny, black, ovate, stipe base scales. It seems to be most closely related to *P. pycnolepis* (Kunze ex Klotzsch) Moore, from the South American Andes and perhaps Costa Rica.

Several collections from central Mexico (Méx., Jal., Hgo., Ver.) seem to be less coriaceous, to have fewer, not so intensely black stipe base scales, larger indusia, and pinnules more dentate-spinulose or incised acroscopically, not inrolled at the margin.

I am uncertain of the applicability of the name *P. distans* to the species as I have described it; Fournier's description is incomplete and I have not found type material.

2. **Polystichum drepanoides** Fourn., Mex. Pl. 1:92. 1872.

—Type: Mexico, Chiapas, "inter San Bartolo et Pueblo-Novo," *Linden s.n.* (P!—Morton photographs 17633, 17634, 17635 at US!).

Aspidium trejoi Christ, Bull. Herb. Boissier (2)5:255. 1905. —*Polystichum trejoi* (Christ) Christ, Bull. Herb. Boissier (2)5:728. 1905. —Syntypes: Costa Rica, Pedregoso, *Tonduz 11853* (P!); Costa Rica, Copey, *Tonduz 11894* (P!); Mexico, Chiapas, San Pablo, *Münch 167* (not found at P; isosyntype DS!). I choose *Münch 167* as lectotype; it is nearly identical to the type of *P. drepanoides*.

Illustration: none found.

Similar to *P. hartwegii*, but differing in the very large fronds, pinnae mostly 15–30 cm long, 3–5 cm broad; pinnules ± spreading, dentate on acroscopic side, not deeply incised; indusia larger, persistent, tan to whitish.

Montane Rain Forest; Northern Highlands (Jitotol Ridge), Central Plateau; 1200–2000 m. Southern Mex. (Gro.). Chiapas Collections: *GM 167* (DS); *Gi 4159*; *T&L 41699*; *23155*; *32341*; *34618*.

This is probably the largest species in the genus in Mexico. It is closely related to *P. hartwegii* and perhaps derived from that species. The sole collection seen from outside Chiapas is *Rzedowski & McVaugh 30* (NY), from Guerrero.

3. **Polystichum erythrosorum** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:225. 1975.

—Type: Mexico, Chiapas, Cerro Mozotal, *Breedlove (with Smith) 22709* (DS!).

Illustration: none.

Rhizome not known, probably large, thick, erect; fronds to ca. 1.3 m long; stipe to ca. 60 cm long, 8 mm diam., densely scaly, some scales ovate, to 2 cm long, 8 mm wide, black and lustrous, other scales bicolorous with a dark brown center and narrow tan margins, upwards the scales concolorous, brown to tan, not so numerous; blade bipinnate, to 70 cm long, 40 cm broad; rachis not proliferous, moderately scaly, scales mostly linear-lanceolate, to 7 mm long, 1 mm wide, sparingly denticulate towards their base; pinnae to 26 pairs, not imbricate, linear-lanceolate, to 26 cm long, 3.2 cm broad, lowermost deflexed, not or scarcely reduced; pinnules to 30 pairs per pinna, not congested, largest 1.6 cm long, 7 mm broad, with an acroscopic lobe, otherwise entire or crenate along acroscopic margin, apex spinulose, basiscopic margin arcuate, subentire; costae, costules, and veins below with numerous twisted, tan, filiform scales; leaf tissue subcoriaceous to coriaceous; sori with a ± persistent, large, reddish-brown, peltate, coriaceous indusium 0.6–0.8 mm broad; $n = 41$ (Chis.).

In Evergreen Cloud Forest; uncommon on higher peaks of Central Plateau (Zontehuitz), s Sierra Madre; 2600–3000 m. Known only from Oax. (*JTM 4195, 5281*, NY, UC), Chis., and Guat. (Stolze, in litt.). Chiapas Collections: *GM 113*, pt. (US); *JTM 1250* (NY, US); *22047*; *22709* (type); *31769*; *40842*; *42723*.

Most closely related to *P. rachichlaena* (which see for differences) and perhaps also to *P. distans*, differing from the latter by the reddish-brown indusia, longer stipes, pinnules more nearly entire, and stipe and rachis scales mostly brown, concolorous. Another close relative is probably *P. furfuraceum*.

4. **Polystichum fournieri** A. R. Smith, Amer. Fern J. 70:27. 1980.

Polystichum muelleri Mett. ex Fourn., Mex. Pl. 1:91. 1872 (not Schum., 1803). —Syntypes: Mexico. "in pinetis prov. Chiapas," *Linden s.n.* (P!); "San Luis de Potosi," *Virlet d'Aost 46* (P—4 sheets!); "Orizaba," *F. Müller 1496* (not found at P); "prope ignovomum Río Frio," *Bourgeau s.n.* (P!). I designate as lectotype *Linden s.n.*, the only fertile specimen of those seen.

Illustration: none found.

Rhizome erect, caudex 1–2.5 cm diam., apex and stipe bases with brownish, concolorous to usually somewhat bicolorous (dark central stripe, lighter margins), linear-lanceolate scales to ca. 10 mm long, 1–2 mm broad; fronds mostly (22) 30–65 cm long, with stipe two-thirds to often equaling blade length, 1–3 mm diam., glabrescent to sparsely fibrillose-scaly distally; blade ovate, mostly (5) 9–20 cm broad with usually fewer than 20 pairs of lateral pinnae, lower pinnae usually deflexed; rachis without buds, fibrillose-scaly, scales tan; pinnae pinnate to infrequently pinnate-pinnatifid, pinnules merely dentate-spinulose at tip and along acroscopic margin, infrequently incised acroscopically with a ± free basal lobe; leaf tissue and costules below ± glabrous or sparsely fibrillose-scaly; sori with a relatively large (to 1.5 mm diam.), tan, persistent indusium, sori usually not confluent at maturity.

In Pine-Oak-Liquidambar Forest, Montane Rain Forest, Evergreen Cloud Forest; relatively common in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1700–3000 m. Southern Mex. (Gro., D.F., Oax.), Pan. Chiapas Collections: *T&L 41685* (DS); *G 222* (BM, K, NY, PH); *G 371* (BM, K, NY, PH); *GM 97* (P, UC, US); *15312*; *15408*; *22605?*; *31748*; *32055*; *32745*; *34694*; *41709*; *41745*.

Most collections of *P. fournieri* are relatively distinct from other polystichums of Mexico and Central America. However, a few collections are difficult to distinguish from small (depauperate?) specimens of *P. rachichlaena*, *P. hartwegii*, and perhaps *P. distans*. Three specimens from the southern Sierra Madre, 1900–2100 m (*22605*; *41621*; *41709*), are especially difficult to place; they seem to be intermediate between *P. fournieri* and *P. distans*.

The name *P. confluens* Fourn. has often been applied to this species; however, an examination of a syntype of that species shows that it is the same as *P. rachichlaena*.

5. **Polystichum furfuraceum** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:226, fig. 6, A–D. 1975.

—Type: Mexico, Chiapas, Zontehuitz, *Münch 113* (DS!; isotypes DS! US!).
Illustration: only the original.

Rhizome not known, probably large, thick, erect; fronds ca. 1 m long; stipes to ca. 30 cm long, 7 mm diam., nearly obscured by very dense scales, these ferruginous to brown, concolorous, or towards the scale base slightly darkened, broadly ovate, to 1.8 cm long, 9 mm broad, margin prominently setiform, teeth to 0.4 mm long, other scales narrowly lanceolate; blade deltoid-lanceolate; rachis without buds, densely scaly like the stipe, lanceolate scales to ca. 1 cm long, 2 mm wide; pinnae to 45 pairs, pinnate, approximate or somewhat imbricate, linear-lanceolate, to 20 cm long, 2 cm broad, lowermost deflexed and slightly shortened; pinnules to 40 pairs per pinna, approximate or imbricate, largest 1 cm long, 4 mm wide, undivided but with a small acroscopic auricle, apex spinulose, basiscopic margin arcuate, entire or spinulose toward apex; costae, costules, and veins below with numerous ferruginous, twisted, filiform scales; leaf tissue subcoriaceous to coriaceous; sori with a small peltate brownish indusium 0.4–0.7 mm diam.

In Evergreen Cloud Forest; rare, higher peaks of Central Plateau, s Sierra Madre; ca. 2800 m. Known only from Chis. and Guat. (Stolze, in litt.). Chiapas Collections: *GM 113* (DS, type); *31807*.

This species has close affinities only to *P. erythrosorum,* known from Chiapas and Oaxaca. The spiny, concolorous, rachis scales, densely scaly (even shaggy) rachis and stipe, and unlobed but crowded pinnules serve to distinguish *P. furfuraceum* from other Chiapas species of *Polystichum.*

6. **Polystichum hartwegii** (Klotzsch) Hieron., Hedwigia 46:355. 1907 (as "*hartwigii*").

—*Aspidium hartwegii* Klotzsch, Linnaea 20:366. 1847. —Type: Guatemala, "in montibus Las Nubes, prope Urbam" [near Guatemala City], *Hartweg 631* (isotypes BM! K! P!—2 sheets).
Polystichum grande Fée, Mém. Fam. Foug. 8:98. 1857. —Type: Mexico, Veracruz, Huatusco, *Schaffner 217* (not found at P; probable isotype K! labeled "Orizaba").
Illustration: **Fig. 73.**

Rhizome erect, caudex mostly 2–4 cm diam., apical scales and those of stipe base linear-lanceolate, mostly 8–20 mm long, 1–2 (2.5) mm broad, brown and concolorous, or often slightly bicolorous with a dark brown (infrequently nearly black) central stripe and lighter brown margins, entire; blade mostly 80–150 cm long, stipes ⅓–⅔ blade length, stramineous to usually brownish, with scattered, spreading, linear-lanceolate scales and also appressed, tan, scurfy scales; blade bipinnate, deltoid-lanceolate, to 90 cm long; pinnae mostly 10–25 cm long, 2.2–3.5 (4.5) cm broad; pinnules often oblique (ca. 60° to costa), incised acroscopically, often with a nearly free, obovate, somewhat enlarged basal lobe and several additional dentate lobes, each lobe spinulose at tip, pinnules on basiscopic side entire and cuneate at base, serrate to serrately incised at middle and toward apex, serrations spinulose, margins not inrolled; costae below moderately fibrillose-scaly; leaf tissue chartaceous to subcoriaceous, sparsely fibrillose-scaly to glabrescent; indusia fugacious to subpersistent, brownish, rather small; sori discrete, not confluent with age; $n = 41$ (Chis.).

Understory in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; common in Northern and Central highlands, Sierra Madre; 900–2300 (2800?) m. Southern Mex. (Oax., Ver., Pue.), Guat., and probably C.R. and Pan.; S.A. (?). Chiapas Collections: *R 838* (NY, PH); *G 217* (NY); *EM 2935* (K, MEXU); *EM 4767* (MEXU); *P 6727* (BM, UC, US); *9318*; *22585*; *25037*; *31234*; *31638*; *31724*; *32272*; *32596*; *33670*; *34433*; *34612*; *38795*; *41652*; *42511*; *42525*; *42773*.

This is the most common species of *Polystichum* at middle elevations in Chiapas. Seemingly, it does not overlap in elevational range with *P. distans, P. erythrosorum,* or *P. furfuraceum.* It may grow with *P. muricatum,* and small specimens of *P. hartwegii* are sometimes difficult to distinguish from *P. muricatum.* The best characters for distinguishing the two are in the stipe base scales, which are often not collected. The closest relatives of *P. hartwegii* appear to be *P. drepanoides* and *P. ordinatum,* which see for differences.

Collections of *P. hartwegii* have most often gone under the name *P. ordinatum,* but I believe that species is distinct, although closely related. If *P. ordinatum* is regarded as not distinct, the name *P. hartwegii* must be used.

7. **Polystichum mickelii** A. R. Smith, Amer. Fern J. 70:25. 1980.

—Type: Mexico, Oaxaca, Dist. Mixes, ne slope of Cerro Zempoaltepetl, trail from La Candelaria to Zacatepec, *Mickel* (*with Leonard*) *4836* (NY!).
Illustration: none.

Rhizome erect, caudex 1.5–3.0 cm diam.; fronds 45–110 cm long, with stipe two-thirds to nearly equaling blade length, stipe base with ovate scales, these bicolorous at very base (tan with narrow, medial, dark-brown stripe), becoming concolorous and light brown distally, to 15 mm long, 6 mm broad, erose-denticulate along margin; blade ovate-attenuate, 12–35 cm broad; rachis not proliferous, glabrescent or with hairlike scales most numerous at pinna bases; pinnae pinnate, pinnules ± entire with a small, deltoid, acroscopic auricle, or on larger fronds with a ± free elliptic lobe at base and beyond that coarsely dentate, basiscopic margin arcuate, entire to minutely spinulose to crenulate; costules below glabrescent or fibrillose-scaly at their base; leaf tissue and veins below ± glabrous, coriaceous, shiny and dark green above, dull and light green below; sori small, apparently exindusiate, not confluent at maturity.

In Montane Rain Forest; uncommon in Sierra Madre; (600 in Oax.) 2100–2500 m. Southern Mex. (Ver., Oax.), Guat., Hond. Chiapas Collections: *G 401* (YU); *25379*; *34385*.

A rather distinct species, without close relatives in Mexico or Central America. It is possibly of the group of *P. platyphyllum,* as indicated by the exindusiate sori. It also resembles somewhat species from southern Brazil, e.g., *P. montevidense* (Spreng.) Rosenst.

The stomates below appear darker green and contrast readily with the surrounding epidermal cells (30× magnification). I have not seen this on other Mexican species of *Polystichum.*

8. **Polystichum munchii** (Christ) C. Chr., Ind. Fil. 585. 1906.

—*Aspidium munchii* Christ, Bull. Herb. Boissier (2) 1:1120. 1901. —Type: Mexico, Chiapas, La Mesilla, near San Cristóbal Las Casas, *Münch 24* (P! isotype DS!).
Illustration: none found.

Rhizome erect; fronds to 45 cm long, 5 cm broad, not proliferous, stipe to ca. 15 cm long, 1–2 mm diam., stramineous to tan, with numerous, tan, fibrillose scales at base; blade 1-pinnate, elongate; pinnae up to ca. 17 pairs, lowermost several pairs stalked ca. 2 mm, all about the same size except for distal few (lowermost not reduced), inequilaterally oblong, lower base excised, superior base auriculate (auricle mucronate, not free), obscurely to deeply dentate along both margins (but not spinulose or mucronate), acute and spinulose at apex; sori with a large, peltate, subpersistent indusium.

Very rare, known from only two Chiapas collections, the type and *Münch 14* (DS, P) from the same area. I have seen a single collection from Guatemala, Alta Verapaz, *von Tuerckheim s.n.*, ed. Donn.-Smith 851 (US). This collection was cited by Maxon (Contr. U.S. Natl. Herb. 16:50. 1912) as *P. triangulum* (L.) Fée from the West Indies. Later, Maxon restricted the name *P. triangulum* to plants from Hispaniola and applied the name *P. echinatum* (Gmel.) C. Chr. to the common once-pinnate, nonproliferous fern from the Antilles (J. Wash. Acad. Sci. 18:583, fig. 1. 1928). *Polystichum munchii* differs from *P. echinatum* in the lower pinnae being not reduced, pinnae less crowded and more oblong rather than lanceolate, the nonspinulose margin, and in stipe base and rhizome apex scales mostly filiform (some ovate scales in *P. echinatum*).

9. **Polystichum muricatum** (L.) Fée, Gen. Fil. 278. 1852.

—*Polypodium muricatum* L., Sp. Pl. 2:1093. 1753. — Type: Petiver's Pteri-graphia Amer. pl. 1, fig. 6, 1712, which is a small copy of Plumier's Tract. Fil. Amer. pl. 39, 1705, representing a plant from Hispaniola (Maxon, Contr. U.S. Natl. Herb. 13:34. 1909).

Aspidium moritzianum Klotzsch, Linnaea 20:367. 1847. — Type: Venezuela, Colonia Tovar, *Moritz 280* (isotype BM!).

Illustration: no good one found.

Rhizome erect, caudex ca. 2 cm diam.; fronds mostly (30) 50–75 cm long, with stipe about half or less blade length, at base with broadly ovate, light to dark brown, ± concolorous scales to 15 mm long, 6 mm broad, or lowermost scales bicolorous with a broad dark brown central stripe and very narrow light brown margins; blade ovate-lanceolate, 12–25 cm broad; rachis not proliferous, fibrillose-scaly, scales light brown; pinnae pinnate, to 13 cm long, mostly 2.0–2.5 cm broad; basal pinnules with a nearly free obovate acroscopic lobe, beyond that crenately incised to dentate, subentire to crenulate on basiscopic margin; leaf tissue and veins below glabrous or sparsely fibrillose-scaly, relatively thin-chartaceous; sori with a small, subpersistent to fugacious, tan indusium; sori not confluent at maturity; $n = 41$ (Chis.).

In Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands, N Sierra Madre; 1350–1700 m. Southern Mex. (Oax.?), Pan.; S.A. (Ven.); Jam., Hisp. Chiapas Collections: *P 10155* (NY, UC); *21808*; *24927*; *28923*; *31316*; *32514*; *32708*.

Those collections that best match the Antillean type are *28923* and *32708*. The remaining collections vary somewhat in the direction of *P. hartwegii*.

10. **Polystichum ordinatum** (Kunze) Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:276. 1849.

—*Aspidium ordinatum* Kunze, Linnaea 18:347. 1844. — Type: Mexico, *Leibold s.n.* [Leib. Verz. No. 39] (LZ, destroyed; presumed isotypes K! P—6 sheets!).

Polystichum bicolor A. R. Smith, Proc. Calif. Acad. Sci. (4)40:223, fig. 6, E–G. 1975. —Type: Mexico, Chiapas, Munic. Tenejapa, Colonia 'Ach'lum, *Ton 1987* (DS!).

Illustration: see under synonym cited.

Rhizome erect, caudex ca. 2 cm diam.; stipe ca. 10–25 cm long, 5 (8) mm diam., densely scaly, scales ascending, narrowly lanceolate, ca. 1.5 cm long, 1–2 mm wide, entire, distinctly and discordantly bicolorous, margin stramineous to tan, center dark brown; blade bipinnate-pinnatisect, to 90 cm long, 28 cm wide; rachis not proliferous, minutely scaly or fibrillose-scaly, scales stramineous to brownish, entire but base dilated and minutely fimbriate; pinnae up to 36 pairs, lanceolate, to 15 cm long, 2.4 cm broad, lowermost 5–8 pairs gradually reduced (lowermost pair 0.3–0.6 of longest pairs); pinnules to ca. 25 pairs per pinna, the largest (basal) to 1.5 cm long, 6 mm wide, on acroscopic side deeply lobate to crenate, apex spinulose; costae below with scattered stramineous scales, costules and veins glabrous; leaf tissue rather thin, chartaceous; sori with indusia 0.5–0.8 mm diam., tan to brownish, sori not confluent at maturity.

In Montane Rain Forest, Evergreen Cloud Forest; uncommon in Central Plateau, s Sierra Madre; 2100–2800 m. Southern Mex. (Ver., Oax.), Guat. (Stolze, in litt.). Chiapas Collections: *T 1987* (DS, type); *T 890* (DS); *EM 2971* (K, NY); *34686*.

Remarkable for the long series of narrowly lanceolate, sharply bicolorous scales of the stipe; closely related to *P. hartwegii* and perhaps derived from it.

In my opinion, the name *P. ordinatum* has been too widely applied. The type and also the Chiapas collections cited have strongly reduced basal pinnae, a character not found on other Mexican polystichums.

11. **Polystichum platyphyllum** (Willd.) Presl, Tent. Pterid. 84. 1836.

—*Aspidium platyphyllum* Willd., L. Sp. Pl., ed. 4, 5:255. 1810. —Type: Venezuela, Caracas, *Bredemeyer s.n.* (B —Herb. Willd. 19789).

Illustrations: Mettenius, Fil. Hort. Bot. Lips. pl. 22, figs. 1–2. 1856; Ettingshausen, Farnkr. pl. 113., figs. 1, 10, 11. 1865.

Rhizome suberect to erect, caudex 1–2 cm diam., apex with tan to brown, concolorous, broadly ovate scales, larger ones 5–10 mm long, to 3 mm broad, similar scales at stipe base; fronds mostly 50–75 cm long; stipe stramineous, ca. ½–¾ blade length, with sparse hairlike scales distally; blade lanceolate-attenuate, apex rather elongate and with simple pinnae similar to pinnules of lower pinnae; rachis nearly always with a small scaly bud in axil of a distal pinna; lower pinnae pinnate, pinnules oblong-rhomboid, crenate along acroscopic margin, often with a single acroscopic auricle, ± entire along basiscopic margin, rounded, blunt, or aristate at tip; leaf tissue below ± glabrous; costae below with a few scattered, hairlike scales; sori exindusiate; $n = 41$ (Chis.).

In Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; locally common in Northern Highlands, uncommon in Eastern Highlands, Sierra Madre; 800–1600 m. Southern Mex. (Ver., Oax.), Nic., C.R.; S.A. (Col. and Ven. to Bol., Parag., NW Arg., Braz.); Jam. Chiapas Collections: *G 287* (YU); *R 839* (NY, PH); *24048*; *25071*; *25111*; *31308*; *31505*; *32513*; *32939*; *38029*.

Most Chiapas collections bear a small bud adaxially along the rachis, and by this character differ from all other *Polystichum* species in Mexico.

Münch 96 (DS, US) is localized on the label as "Chiapas" but matches nothing I have seen from either Mexico or Central America. It does resemble specimens of the allied *P. lanosum* Fée (e.g., *Glaziou 4667*, UC) from southern Brazil, a species lacking buds and with larger rhomboid pinnules.

12. **Polystichum polyphyllum** (Presl) Presl, Tent. Pterid. 83. 1836. *Nephrodium polyphyllum* Presl, Rel. Haenk. 1:37. 1825.

—TYPE: "Peruvia?," collector not stated, Herb. Mus. Nat. Prague no. 23912 (photo BM!).

ILLUSTRATION: Hooker & Greville, Icon. Fil. 2:pl. 163. 1830 [as *Polypodium rigidum* Hook. & Grev.].

Rhizome erect, caudex 1–2.5 cm diam.; apex and stipe base with dense, tan to brown, concolorous, broadly ovate-attenuate scales, larger ones to 12 cm long, 5 mm broad; fronds to ca. 40 cm long; stipes stramineous to tan, about two-thirds to equaling blade length, with scattered to moderately dense, ferruginous, ovate to lanceolate-attenuate scales distally; blade linear-lanceolate; rachises without buds, moderately scaly; pinnae pinnate, 2–4 cm long, 1.0–1.4 cm broad, with 2–6 pairs of pinnules, these oblong-rhomboid, not or obscurely spinulose, crenulate, margins very strongly inrolled; costae and veins below with scattered, ferrugineous scales; leaf tissue coriaceous, ± glabrous; sori exindusiate, confluent at maturity.

Flat meadows and steep slopes with *Pinus, Juniperus*, and *Buddleia*; locally common near top of Volcán Tacaná (s Sierra Madre); 3600–4200 m. Otherwise known from Guat., C.R.; S.A. (Peru, Bol.). CHIAPAS COLLECTIONS: *EM 2352* (MEXU, NY, US); *Mc s.n.* (US); *24306*; *24319*; *26705*; *29377*.

An easily recognized species, not closely related to any other known from Mexico. The disjunct distribution is notable; nevertheless, Chiapas specimens are virtually identical to collections from South America.

Breedlove 24319 appears very different by the thin-textured blades without inrolled margins. Most likely, it was growing in a very protected place.

13. **Polystichum rachichlaena** Fée, Mém. Fam. Foug. 8:100. 1857.

—TYPE: Mexico, Popocatepetl, 3000 m+, *Schaffner 290* (not found at P; probable isotype K!). *Schaffner s.n.* (P!) seems to be the same as the Kew specimen.

Polystichum confluens Fourn., Mex. Pl. 1:92. 1872. —SYNTYPES: Mexico, San Andrés, *Bottieri 1443*, Herb. Van Heurck; San Rafaël, *Guillemin s.n.* (P!).

ILLUSTRATION: none found.

Similar to *P. erythrosorum* but differing by the somewhat smaller fronds to 1 m long with pinnae 7–14 cm long; indusia very large, flat, persistent, thick; stipe base scales ovate to lanceolate, dark to light brown, concolorous, or scales indistinctly bicolorous with dark brown central stripe grading into lighter brown margins (but without black, shiny, stipe base scales).

In Evergreen Cloud Forest; uncommon in Central Plateau; 2300 m. Otherwise known from higher mountains and volcanic peaks of s Mex. (Méx. D.F., Mlos., Pue., Oax.). CHIAPAS COLLECTIONS: *33557*; *34802*?; *41092*.

Chiapas specimens do not match perfectly those from elsewhere in Mexico but can be placed here until monographic work reveals their correct disposition. The large, tan, flat indusia and more or less uncut pinnules serve to distinguish this species from related ones (*P. hartwegii, P. drepanoides*). The closest relative of *P. rachichlaena* may be *P. erythrosorum*, which differs by the thin, reddish indusia and presence of at least a few large, shining, blackish scales at the stipe base.

UNNAMED COLLECTIONS

There remain a small number of collections that I cannot place in any of the described species but do not wish to describe because of inadequate material: *Purpus 7231, 7232* (UC), *7243A* (BM) are all the same, collected at Finca Irlanda. I have seen two very similar collections from Guatemala: *Steyermark 33834, 35194* (F). These collections most resemble *P. mickelii* but have a small indusium and some broader, ovate-lanceolate, erose-denticulate rachis scales. In my key, they would come out to *P. hartwegii*, but they seem distinct from that species. Stipe bases are not present in the material seen.

87. PTERIDIUM

Pteridium Gled. ex Scopoli, Fl. Carn. 169. 1760, nom. cons. —TYPE: *Pteridium aquilinum* (L.) Kuhn [≡*Pteris aquilina* L.].

Plants terrestrial; rhizome long-creeping, hairy, without scales, branching, solenostelic; stipe with numerous vascular bundles, bearing buds toward their base that may develop into new rhizomes; blade pinnately compound, 2–4-pinnate; lower pinnae with nectaries at the base; veins free, forking; sori marginal, mostly continuous; leaf tissue chartaceous to subcoriaceous; sporangia borne between outer indusium, the modified reflexed margin of the segment, and inner indusium; receptacle a vascular strand connecting vein-ends; spores brownish, tetrahedral-globose, with a trilete scar; $x = 52$ (from 26?).

As interpreted by Tryon (1941) *Pteridium* comprises a single subcosmopolitan species occurring in all temperate and tropical regions. It is a notorious "weed" in many areas, where it invades fields and pastures and cut-over woodlands, often forming large colonies.

Its closest relatives are apparently *Hypolepis* and *Paesia*, which have similar morphological features and also $x = 26$ (*Paesia*) or $x = 52$ (one of the base numbers in *Hypolepis*).

REFERENCE: TRYON, R. 1941. Revision of the genus *Pteridium*. Rhodora 43:1–31; 37–67 [reprinted in Contr. Gray Herb. 134. 1941]; J. Linn. Soc., Bot. 73:1–302. 1976 ["The biology of bracken," with papers by many authors].

1. **Pteridium aquilinum** (L.) Kuhn *in* v. d. Decken, Reisen in Ost-Africa 3(3):11. 1879.

—*Pteris aquilina* L., Sp. Pl. 2:1075. 1753. —Lectotype (chosen by Tryon, 1941:19): figure of "*Filix femina*" Fuchs, Hist. 596, misprinted 569 (1542), illustrating a European plant.

For additional synonymy, see Tryon (1941:16–17).

Tryon (1941) divided *P. aquilinum* into 2 subspecies and 12 varieties; both subspecies and 3 varieties occur in Chiapas. Subspecies *aquilinum*, represented by var. *feei*, is relatively easy to distinguish from subsp. *caudatum*, represented by vars. *caudatum* and *arachnoideum*; in addition to the morphological features mentioned in the key below, var. *feei* in Chiapas generally grows at higher elevations in less disturbed areas than the two varieties of subsp. *caudatum*. Varieties *caudatum* and *arachnoideum* are closely related, as pointed out by Tryon. They seem to be found at mostly lower elevations in decidedly "weedy" habitats. The following key, modified from Tryon (1941) will distinguish the Chiapas varieties.

a. Ultimate segments adnate, equally decurrent and sursumcurrent, or sursumcurrent; pubescence of lower surface usually lanuginose; penultimate segments without a long-caudate tip; fronds not scandent, mostly less than 1 m long, with vernation equal to subgleichenioid (ssp. *aquilinum*) .... 1c. var. *feei*

aa. Some of ultimate segments decurrent only, or more strongly decurrent than sursumcurrent; pubescence of lower surface straight, appressed or arachnoid, rarely sublanuginose or absent; penultimate segments with a long-caudate tip; fronds subscandent, mostly greater than 1 m long, with vernation gleichenioid (ssp. *caudatum*).

  b. No free lobes present on axes between segments; midnerves on lower surface of ultimate segments usually glabrous; fertile portion of indusia broader than the sterile on the same segment .... 1b. var. *caudatum*

  bb. Free lobes present on axes between segments; midnerves on lower surface of ultimate segments usually dark-pubescent; fertile portion of indusia usually not broader than the sterile on the same segment .... 1a. var. *arachnoideum*

1a. **Pteridium aquilinum** var. **arachnoideum** (Kaulf.) Brade, Zeitsch. Deut. Ver. Wiss. Kunst. São Paulo 1:56. 1920.

—*Pteris arachnoidea* Kaulf., Enum. Fil. 190. 1824. —*Pteridium arachnoideum* (Kaulf.) Maxon, J. Wash. Acad. Sci. 14:89. 1924. —Type: Brazil, *Chamisso s.n.* (LE; photo GH).

For additional synonymy, see Tryon (1941:58).

Illustrations: Tryon (1941:pl. 650, figs. 10, 13, 14; also pl. 653, fig. 3); Vellozo, Fl. Flum. 11:pl. 80. 1827; Tryon, Contr. Gray Herb. 194:183, fig. 137. 1964.

Fronds 1–3 m long, with stipe usually shorter than blade; vernation apparently gleichenioid, basal pinnae completely unrolled, third or fourth pinnae completely inrolled; blade ovate-triangular to long-triangular, 3–4-pinnate; rachis glabrous to slightly pubescent; pinnules at nearly right angles to costa; penultimate segments with a caudate apical segment; costules of penultimate segments usually pubescent beneath; ultimate segments narrowly ovate to usually linear, decurrent or more strongly decurrent than sursumcurrent; free lobes present along axes between segments; lower surface usually arachnoid-pubescent; membranous wings usually present along veins and midnerves; fertile and sterile indusia ciliate and sometimes also pubescent on outer surface; $2n = 208$, irreg. meiosis (Gal.).

Open slopes, thickets, roadbanks, edges of forests, and cleared lands adjacent to Tropical Rain Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, n Sierra Madre; 300–1600 m. Southern Mex. (Méx., Ver., Gro., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., Braz., n Arg., Parag., Urug.); Gr. Antill., St. Lucia, Trin. Chiapas Collections: *T&L 41491* (DS); *21816*; *25086*; *34244*.

1b. **Pteridium aquilinum** var. **caudatum** (L.) Sadebeck, Jahrb. Hamburg. Wiss. Anst. Beih. 14:3, 5. 1897.

—*Pteris caudata* L., Sp. Pl. 2:1075. 1753. —*Pteridium caudatum* (L.) Maxon, Proc. U.S. Natl. Mus. 23:631. 1901. —Lectotype (chosen by Tryon, 1941:55): LINN 1246.15?, probably a plant from the West Indies.

Pteris aquilina var. *mexicana* Fée, Mém. Fam. Foug. 8:114. 1857. —Type: Mexico, no specimen cited.

For additional synonymy, see Tryon (1941:54).

Illustrations: Tryon (1941:pl. 650, figs. 9, 12; also pl. 653, fig. 4); Proctor, Fl. L. Antill. 2:134. 1977.

Fronds usually 1.2–2.5 m long, scandent, with stipe about as long as blade; vernation apparently gleichenioid, basal pinnae completely unrolled, third or fourth pinnae completely inrolled; blade ovate to long-triangular, 3–4-pinnate; rachis glabrous to slightly pubescent; pinnules at nearly right angles to costa; penultimate segments with a long-caudate, apical segment; costules of penultimate segments usually glabrous beneath; ultimate segments usually linear, remote, free or adnate, more decurrent than sursumcurrent; free lobes absent along axes between segments; lower surface glabrous to densely arachnoid-pubescent, midnerve usually glabrous; membranous wings only rarely present along veins and midnerves; fertile and sterile indusia usually glabrous.

Clearings, rough pastures, dry hillsides, in cut-over forests, pinelands; uncommon in Northern Highlands, se Central Plateau; 500–1300 m. Mexico (N.L., Tam., Baja C.S., Sin., Nay., Cma., Jal., Mich., Gro., Ver., Oax., Yuc., Q. Roo), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col., Ven., Peru); Fla., Berm., Antill. Chiapas Collections: *Ar 164* (DS); *G 237* (PH); *R 835* (GH, NY, PH); *14965*; *22377*.

1c. **Pteridium aquilinum** var. **feei** (Schaffner ex Fée) Maxon ex Yuncker, Publ. Field Mus. Nat. Hist., Bot. Ser. 17:308. 1938.

—*Pteris feei* Schaffner ex Fée, Mém. Fam. Foug. 8:73. 1857. —*Pteridium feei* (Schaffner ex Fée) Faull, Contr. Arnold Arbor. 11:87. 1938. —Syntypes: Mexico. Veracruz, Huatusco, *Schaffner 138* and *141*; also Popocatepetl, *Schaffner 186* (P?).

Illustration: Tryon (1941:pl. 651, fig. 1; also pl. 650, fig. 4).

Fronds 20–110 cm long with stipe shorter than to about equaling blade; vernation equal to subgleichenioid, tips of upper pinnae still inrolled while basal pinnae completely unrolled; blade broadly ovate or pentagonal, or subternate, usually bipinnate-pinnatifid to tripinnate; rachis slightly to strongly pubescent, or glabrate; pinnules at right angles or usually ascending with respect to costa; penultimate segments pinnatifid to pinnate-pinnatifid; longest entire segment 3–8 (usually ca. 4) times longer than broad; ultimate segments usually straight, broadest at base, adnate, equally decurrent and sursumcurrent, or sursumcurrent; lower surface usually densely pubescent; fertile and sterile indusia ciliate and sometimes also pubescent on outer surface.

Scattered in Pine-Oak or Pine-Oak-Liquidambar forests, Evergreen Cloud Forest; scattered in Central Plateau, uncommon in Northern Highlands (Jitotol Ridge), Sierra Madre; 1300–2800 (3000) m. Southern Mex. (Dgo., S.L.P., Hgo., Méx., Nay., Jal., Gto., Mich., Gro., Mlos., Pue., Ver., Oax.), Guat., Salv., Hond. CHIAPAS COLLECTIONS: *L&S 9834* (UC, US); *T 43* (DS); *JTM 1211* (US); *GM 47a* (DS); *6646*; *15434*; *21401*; *22404*; *36961*; *40458*.

88. PTERIS

Pteris L., Sp. Pl. 2:1073. 1753. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 295. 1875): *Pteris longifolia* L.
Litobrochia Presl, Tent. Pterid. 148. 1836. —TYPE: *Litobrochia ampla* (Kunze) Presl [=*Pteris grandifolia* L.].

Plants terrestrial; rhizome usually stout, short-creeping to erect, dictyostelic or polycyclic-siphonostelic; fronds pinnate to decompound, often with basal basiscopic pinnule greatly enlarged, fronds thus pentagonal; stipe thin to often stout, with numerous vascular bundles; blade usually glabrous, less commonly hairy or sparingly scaly; axes of penultimate segments antrorsely awned above in many species; veins free or anastomosing, without included veinlets; sori continuous on a marginal commissural vein (absent at apices of segments and sinuses between segments), covered by the reflexed scarious blade margin; paraphyses numerous; spores tetrahedral, with an equatorial rim or flange, reddish brown, often iridescent bluish green, smooth or sculptured; $x = 29$.

Pantropical, with about 280 species according to Copeland (1947), but Copeland included *Lonchitis* (ca. 2 spp.) and *Blotiella* (ca. 15 spp.) within its circumscription. These small genera are now usually excluded from *Pteris*. Tryon (1964) estimated about 50 species of *Pteris* in South America, and there are fewer than 10 additional species restricted to North America, making the total for the Neotropics 60 or fewer. Most of the Chiapas species are widely distributed, extending into South America and even the Old World.

REFERENCES: TRYON, R. 1964. Contr. Gray Herb. 194:1–253 [treatment of *Pteris*, pp. 188–210]; SCAMMAN, E. 1961. The genus *Pteris* of Costa Rica. Rhodora 63:194–205.

a. Supra-basal pinnae entire, narrowly linear, not pinnatifid.
  b. Veins anastomosing (only toward margin in *P. grandifolia*); fronds usually at least 1 m long.
    c. Lowermost pinnae simple .... 5. *P. grandifolia*
    cc. Lowermost pinnae pinnate or more.
      d. Marginal areoles ca. 1 mm or more broad; apex of segments sharply serrate .... 3. *P. chiapensis*
      dd. Marginal areoles ca. 0.5 mm broad; apex of segments entire or minutely serrate .... 12. *P. pulchra*
  bb. Veins entirely free; plants usually less than 1 m long.
    e. Stipe and rachis densely hairy and scaly; blade simply pinnate .... 6. *P. longifolia*
    ee. Stipe and rachis glabrous or nearly so; lowermost pinnae usually bipartite .... 4. *P. cretica*
aa. Supra-basal pinnae lobed, pinnatifid, or more divided.
  f. Veins entirely free.
    g. Blade pedate; basal pinnae pinnate-pinnatifid beyond basal pinnules.
      h. Segments rounded or toothed, not mucronate at tip; leaf tissue thin, membranaceous; stipe without spines .... 8. *P. muricella*
      hh. Segments mucronate at apex; leaf tissue chartaceous to subcoriaceous; stipe usually spinulose .... 7. *P. muricata*
    gg. Blade not pedate; basal pinnae pinnatifid beyond basal pinnules.
      i. Veins all arising from the costules of the segments .... 14. *P. quadriaurita*
      ii. Some veins arising from costae and running to sinuses between segments.
        j. Stipe reddish; sinuses mostly asymmetrical; pinna axils smooth to slightly muricate; leaf tissue thin .... 10. *P. paucinervata*
        jj. Stipe stramineous to tan; sinuses symmetrical; pinna axils strongly muricate; leaf tissue chartaceous to subcoriaceous .... 13. *P. pungens*
  ff. Veins anastomosing, at least along costules.
    k. Veins free except for costular areoles; blade not at all pedate .... 2. *P. biaurita*
    kk. Veins anastomosing in several rows of areoles; blade at least slightly pedate.
      l. Two or more (often three) areoles, with their long axis parallel to costa of penultimate segments, between adjacent costules .... 1. *P. altissima*
      ll. A single areole, with its long axis parallel to costa of penultimate segment, between adjacent costules.
        m. Fronds mostly 2–5 m long, with stipes to 2 cm diam.; sinuses broad, rounded; leaf tissue below with numerous ferruginous, shining hairs .... 11. *P. podophylla*
        mm. Fronds mostly 1–2 m long with stipes less than 1 cm diam.; sinuses narrow, acute; ferruginous hairs mostly confined to costae and costules below .... 9. *P. orizabae*

1. **Pteris altissima** Poir. *in* Lam., Encycl. Méth. 5:722. 1804.

—TYPE: Puerto Rico, *Ledru s.n.* (P—LA!, photo GH).

Pteris kunzeana J. G. Agardh, Rec. Gen. Pterid. 62. 1839. —*Litobrochia kunzeana* (Ag.) Fée, Gen. Fil. 135. 1852. —SYNTYPES: *Leprieur* (G—Herb. Delessert); "ad Cayennam," *Richard* (P); Peru, *Mathews s.n.* (K! fragm. NY); Peru, *Poeppig s.n.* (K! probable isotype B).

Pteris protea Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:228. 1849. —TYPE: Mexico [Veracruz], Colipa, *Liebmann s.n.* (holotype presumably C, not found; isotypes K!, BM!—photo UC!).

ILLUSTRATIONS: Tryon (1964:203); Hooker, Sp. Fil. 2:pl. 139. 1858.

Rhizome stout, erect; fronds mostly 1–2 (3) m long, stipe about as long as blade; blade bipinnate to deeply bipinnatifid, basal pinnae largest, to 65 cm long, unequally deltoid, basiscopically produced, long-stalked; second pair of pinnae pinnate to pinnatifid, but more distal pinnae mostly pinnatifid, cuneate at base; ultimate segments lanceolate, oblique, 4–10 mm broad, with rounded sinuses, sterile tips of segments sharply serrate; venation areolate, with 2–3 costal areoles (their long axis parallel to costa) between adjacent costules; leaf tissue firm-herbaceous; $n = 58$, $2n = 116$ (Jam., Ver.).

In Tropical, Lower Montane, and Montane rain forests, less often Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; common in Northern and Eastern highlands, also s Pacific Coastal Plain, N edge of Central Plateau; 200–1350 m. Southern Mex. (S.L.P., Hgo., Ver., Oax., Tab.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Gui. and Bol., Braz.); Antill. CHIAPAS COLLECTIONS: *P 6730* (BM, UC, US); *GM 99* (DS, US); *GM 145B* (DS, US); *R 814* (PH); *C&D 214* (US); *Se 5499* (US); *G 376* (K, PH); *22242*; *22460*; *22531*; *26572*; *31486*; *32511*; *32812*; *33087*; *33273*; *33358*; *33851*; *34066*; *34466*; *36648*; *42006*.

Most specimens of this species are very distinct. However, a disturbing (and interesting) number are intermediate between *P. altissima* and *P. orizabae*. These intermediates are discussed under the latter species.

2. **Pteris biaurita** L., Sp. Pl. 2:1076. 1753.

—LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:145. 1977): Plumier's Descr. Pl. Amer. pl. 14, 1693 (=Plumier's Tract. Fil. Amer. pl. 15, 1705), illustrating a plant presumably from Martinique or Hispaniola; LINN 1246.19 is this species, but according to Jackson's index (1912), this specimen was added to LINN after 1755.

Litobrochia galeottii Fée, Mém. Fam. Foug. 8:75. 1857. —TYPE: Mexico, Oaxaca, Teotalingo, *Galeotti 6485* (presumably P).

ILLUSTRATIONS: Tryon (1964:203); Hooker & Greville, Icon. Fil. 2:pl. 142. 1829 or 1830; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 4, fig. 1. 1897.

Rhizome suberect, moderately stout; fronds 0.6–1.5 m long, stipe as long as blade; blade pinnate-pinnatifid, with a pinnatifid conform terminal pinna, lowermost pinnae bipartite with basal basiscopic pinnules elongate and deeply pinnatifid; pinnae 6–15 pairs, all but basal ones sessile, 10–25 (35) cm long, to 7 cm broad, usually broader on basiscopic side, with a long caudate linear tip (2–8 cm); segments linear-oblong, straight or falcate; veins free except for a single costal areole between adjacent costules (occasionally a few other basal veins joined), secondary veins arising from areolar vein; $2n = 58$, apogamous (Jam., O.W.).

Tropical Deciduous Forest, Lower Montane Rain Forest; uncommon in s Sierra Madre, Northern Highlands; 550–700 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Col. to Gui. and Peru, Braz.); Antill.; O.W. trop. CHIAPAS COLLECTIONS: *22573*; *32837*.

3. **Pteris chiapensis** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:226, fig. 6, H–J. 1975.

—TYPE: Mexico, Chiapas, Munic. Ocozocoautla de Espinosa, 26–28 km N of Ocozocoautla, *Breedlove 22492* (*with Smith*) (DS—2 sheets!).

ILLUSTRATION: only the original.

Rhizome erect, caudices ca. 3 cm diam.; fronds more than 1 m long (complete specimen not seen), probably with stipe about equaling blade in length; stipe ca. 8 mm diam. at base, stramineous, glabrous; blade ca. 60 cm long, bipinnate to tripinnate at base, upwards bipinnate, ultimately simply pinnate; lowermost pinnae largest, ca. 50 cm long, 35 cm wide; ultimate segments to 25 cm long, 1.5 cm wide, narrowly cuneate and stalked to 3 cm at base, entire, apex serrate; venation areolate, areoles in 2–3 series, costal areoles 2.0–2.5 mm wide, very short, marginal areoles ca. 1 mm wide; leaf tissue chartaceous, glabrous; sori continuous along margins except at serrate apex.

Known from a single collection in Lower Montane Rain Forest; Northern Highlands; 700 m. Endemic.

I still regard this species as distinct, but its affinities may be closer to *P. altissima* rather than *P. pulchra*; it resembles the former better in the pattern of its venation, the latter in frond form. *Pteris altissima* has been collected at the same locality (*22460*), but *P. pulchra* was not found. The spores of *P. chiapensis* appear well formed.

4. **Pteris cretica** L., Mant. 130. 1767.

—LECTOTYPE (chosen by Tryon, Contr. Gray Herb. 194: 192. 1964): Crete, LINN 1246.7, photo A. LINN 1246.8 is also this species.

Pteris triphylla Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):51, pl. 14, fig. 1. 1842. —TYPE: Mexico, Veracruz, Jalapa, *Galeotti 6393* (holotype BR! isotype BR!).

ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 26. 1909; Tryon (1964:193); Wherry, Southern Fern Guide 209. 1964.

Rhizome small, ca. 0.5 cm diam., short-creeping; fronds 15–70 (100) cm long, stipe usually longer than blade, fertile fronds taller and divisions more constricted than on sterile fronds; blade 1-pinnate, but with lowermost pinnae bipartite because of a greatly elongate, nearly free, basiscopic segment (occasionally lowermost pinnae tripartite), simply pinnate above basal pinnae (rarely the suprabasal pinnae also bipartite); pinnae 1–5 pairs, lowermost short-stalked, distally becoming sessile, then adnate and decurrent, mostly 0.6–1.5 cm broad, to 15 or more cm long; margins of sterile pinnae and sterile tips of fertile pinnae serrulate; leaf tissue chartaceous, glabrous or nearly so beneath; veins simple or 1-forked, parallel, not anastomosing; $n = 29$, $2n = 58$ (Nepal), $n = 87$ (Jap., N. Gui.).

Partially exposed rocky slopes in or adjacent to Pine-Oak or Pine-Oak-Liquidambar forests, rarely Evergreen Cloud Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, rare in s Sierra Madre; 1600–2700 (3200) m. Southern Mex. (Chih., Gro., Mich., Hgo., Méx., N.L., Jal., Pue., Oax., Ver.); Guat., O.W. Widely cultivated and escaping in the New World (Fla., Jam., C.R., Peru, N Arg,) but seemingly native to the Old World and perhaps southern Mexico. Chiapas Collections: *R 966* (PH); *G 202* (K, PH); *L&S 9878* (UC, US); *Li 1545* (K); *EM 4639* (MEXU, DS); *MC 1610* (US); *T&L 41212* (DS); *T&L 41559* (DS); *C 286* (DS); *La 5249* (DS); *R&B 19874* (DS, US); *GM 73* (DS, US); *15086*; *21394*; *25300*; *26806*; *27244*; *32041*; *32742*.

5. **Pteris grandifolia** L., Sp. Pl. 2:1073. 1753.

—*Litobrochia grandifolia* (L.) J. Smith, J. Bot. (Hooker) 4:163. 1841. —*Heterophlebium grandifolium* (L.) Fée, Gen. Fil. 139, pl. 11A, figs. 9–12. 1852. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:143. 1977): Plumier's Tract. Fil. Amer. pl. 105, 1705, illustrating a plant from Haiti, collected between Léogane and Petit Goave. Tryon's (Contr. Gray Herb. 194:197. 1964) choice of LINN 1246.1 as type is unacceptable since, according to Jackson's list, this specimen was added to LINN after 1755.

Illustrations: Tryon (1964:198); Rovirosa, Pterid. Sur Mex. pl. 43. 1909; Lowe, Ferns 3:pl. 49. 1857.

Rhizome ca. 1 cm diam., creeping; fronds mostly 1–3 m long, stipe about half as long as blade; blade pinnate, pinnae simple, entire, short-stalked to subsessile with roundish or broadly cuneate base and attenuate tip, 20–45 cm long, 1.5–5 cm broad, terminal pinna conform; venation areolate, costal areoles long, parallel, divergent from the costa, the subsequent areoles becoming progressively shorter and less regular; leaf tissue chartaceous to subcoriaceous, minutely tortuous-pubescent (or glabrescent); $n = 58$, $2n =$ ca. 116 (Jam., S.L.P.).

Roadside ditches and banks, Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest, infrequently Pine-Oak-Liquidambar Forest; common in Northern and Eastern highlands, E edge of Central Plateau, uncommon in Central Depression; 300–1350 m. Southern Mex. (S.L.P., Mich., Oax., Ver., Tab.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Peru); Antill. Chiapas Collections: *C 65* (DS); *GM s.n.* (DS); *G s.n.* (US); *G 387* (K, PH); *S 1618* (MEXU, US); *R&R&M 1424* (US); *R&R&M 988* (US); *H&S 19962* (US); *C&D 145* (US); *C&D 228* (US); *20721*; *22113*; *22231*; *22442*; *32533*; *33799*; *33923*; *34492*.

6. **Pteris longifolia** L., Sp. Pl. 2:1074. 1753.

—Lectotype (chosen by Proctor, Fl. L. Antill. 2:141. 1977); Plumier's Descr. Pl. Amer. pl. 18, 1693 (=Tract. Fil. Amer. pl. 69, 1705), illustrating a plant from Haiti near Port de Paix; according to Jackson's (1912) index, LINN 1246.2 was added to LINN after 1755.

Illustration: Wherry, Southern Fern Guide 205. 1964.

Rhizome short-creeping to suberect at apex, densely clothed with yellowish to rusty-brown lanceolate scales, similar scales extending along stipe and rachis; fronds mostly 0.3–1 m long, stipe shorter than blade; blade 25–75 cm long, 10–30 cm broad, somewhat diminished at base, pinnate with a conform apical pinna; pinnae horizontal, linear, 5–15 cm long, 3–10 mm broad, the fertile often slightly constricted, articulate (petiolule abruptly attached to rachis), sessile from a cordate base, the sterile minutely crenulate-serrulate; veins mostly 1–2-forked; leaf tissue rigidly herbaceous to subcoriaceous, fibrillose-scaly on costae and veins, glabrescent; $n = 58$, $2n = 116$ (Jam.).

Roadbanks and margins of Seasonal Evergreen Forest, Pine-Oak-Liquidambar and Pine-Oak forests, infrequently Lower Montane and Montane rain forests; relatively common in Northern and Eastern highlands, Central Plateau, Central Depression; 700–1900 m. Southern Mex. (Mich., Gro., Méx., S.L.P., Ver., Oax., Tab.), Bel., Guat.; Fla., Antill. Chiapas Collections: *GM 11* (DS, US); *R&B 20077* (DS, US); *Se 5474* (US); *C&D 127* (US); *C&D 146* (US); *T&L 41560* (DS); *R 833* (PH); *H&S 19924* (US); *G 385* (K); *R&R&M 982* (US); *13851*; *19923*; *22142*; *22371*; *22441*; *27825*; *32149*; *33062*; *33427*; *33754*.

Closely related to the Old World *P. vittata* L., an escape from cultivation in many areas of the New World (Morton, Amer. Fern J. 47:7–14. 1957). *Pteris vittata* is distinguished from *P. longifolia* by the pinnae fewer, wider, more deeply serrate, and more oblique to the rachis. It has not yet been found in Mexico or Central America.

7. **Pteris muricata** Hook., Sp. Fil. 2:193, pl. 123B. 1858.

—Type: Colombia, Dept. Antioquia, *Jervise s.n.* (K!).

Illustrations: Tryon (1964:193); Hooker, Sp. Fil. 2:pl. 124. 1858 [as *P. coriacea*].

Rhizome stout, suberect; fronds mostly 1–2 m long, stipe about as long as blade, mostly 5–10 mm diam., muricate, spinules ca. 1 mm long; blade tripinnate-pinnatifid at base, tripartite; lowermost pinnae ca. 45–60 cm long, strongly basiscopically developed, basal basiscopic pinnule greatly enlarged, 30 cm or more long; penultimate segments lanceolate, deeply pinnatifid nearly to costules, broadest at base; ultimate segments linear-falcate, spinulose at tip; leaf tissue subcoriaceous; indusia continuous along both sides of each segment for nearly entire length of segment, interrupted only at apex and sinus.

In Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest; widely scattered localities in the Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1200–2700 m. Southern Mex. (Oax., Ver.), Nic., C.R., S.A. (Col. to Bol.). Chiapas Collections: *EM 2065* (MEXU); *EM 5433* (US); *31688*; *31879*; *32359*; *32749*; *33570*; *34614*; *34687*.

The muricate stipes separate this species from *P. deflexa* Link, from the Greater Antilles and South America (Peru, Brazil). *Pteris muricata* seems perhaps more closely related to *P. coriacea* Desv. from Ecuador and Peru. The latter, however, has once-pinnate penultimate segments. All three species seem sufficiently distinct (for a different opinion, see Tryon, 1964).

South American specimens of *P. muricata* are generally more coriaceous than Mexican material, and it is possible that Mexican material represents a distinct variety or even species.

8. **Pteris muricella** Fée, Mém. Fam. Foug. 8:73. 1857.

—Type: Mexico [Veracruz], near Cordoba and Huatusco, *Schaffner 143* (P?, not found.)

Pteris mollis Christ, Bull. Herb. Boissier 4:658. 1896. —Type: Costa Rica, "forêts de San Marcos," *Tonduz 7565* (BR?; isotypes P! US).

Illustrations: **Fig. 74**; Scamman (1961:201, penultimate segment).

Rhizome erect, caudex 1.5–2.0 cm diam.; fronds ca. 60–100 (150) cm long, with smooth, glabrous, reddish stipe about as long as blade; blade tripartite, lowermost pair of pinnae with basal basiscopic pinnule greatly enlarged, 20 cm or more long, these pinnules pinnate-pinnatifid, more distal pinnules merely deeply pinnatifid, to ca. 10 cm long, 1.5–2.5 cm broad, with a caudate tip; secondary pinnae merely pinnatifid, up to ca. 20 pairs; ultimate segments oblong, crenate at apex; veins free, simple or 1-forked, lowermost pair of each segment reaching margin above sinus; leaf tissue thin, herbaceous, essentially glabrous; sori occupying middle third to half of each ultimate segment.

Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; common in Sierra Madre, known from a single locality in the Central Plateau and two localities in the Eastern Highlands; (800) 1600–2100 m. Southern Mex. (Ver.), Guat., Nic., C.R., Pan.; S.A. (Ven.). Chiapas Collections: *GM s.n.* (DS); *EM 233* (MEXU, US); *EM 5168* (MEXU, US); *P 10248* (UC); *P 10311* (US); *P 10348* (US); *21751*; *22840*; *24904*; *25068*; *25353*; *31322*; *31353*; *32985*; *33076*; *34408*; *40240*; *41620*; *42015*.

9. **Pteris orizabae** Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):52, pl. 13. 1842.

—*Pteris apicaulis* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:230. 1849 [nom. superfl.]. —*Litobrochia orizabae* (Mart. & Gal.) Fée, Gen. Fil. 135. 1852. —Type: Mexico, "Vaqueria del Jacal," *Galeotti 6252* (BR! photo BM!).

Litobrochia setifera Fée, Gen. Fil. 138. 1852. —Type: Mexico, "super montem ignivomum S. Martini," *Galeotti 6571* (presumably P; isotypes BR—2 sheets, photos BM!).

Illustration: see original.

Rhizome erect, stout; stipe smooth, to ca. 1 m long, as long as or slightly longer than blade; fronds tripartite at base, two lowermost pinnae again bipartite; penultimate segments short-stipitate, decurrent to cuneate at base, pinnatifid, somewhat narrower along basiscopic side, to ca. 3.5 cm broad, 25 cm long; segments oblique, subfalcate to falcate, tips of fertile segments sharply serrate, often apiculate at tip, sterile segments serrate throughout; sinuses narrow, acute; leaf tissue chartaceous, with reddish-brown multicellular hairs on veins and costae, glabrescent; venation areolate, with a single areole with its long axis parallel to costa between adjacent costules; n = ca. 58 (Chis.).

In Montane Rain Forest, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; common around higher peaks of Central Plateau and in Sierra Madre; 1600–3000 m. Southern Mex. (Ver., Hgo., Mich., Méx., Oax.), Guat., Salv., Nic. Chiapas Collections: *EM 235* (MEXU); *EM 2936* (US); *EM 15433* (MEXU); *G 373* (BM, K, YU); *GM 15* (DS, US); *L&S 9935* (UC, US); *9071*; *15220*; *21765*; *22003*; *22053*; *22710*; *25048*; *26263*; *31335*; *31626*; *31777*; *31876*; *32057*; *34409*; *41080*; *42660*.

Several collections are more or less intermediate morphologically between *P. orizabae* and *P. altissima*. These two species are very distinct in their typical form, and I am unwilling to expand the circumscription of either to accommodate the following Chiapas collections: *24028, 25462, 33621, 23187, 32622*. These collections are from middle elevations (1500–2300 m), mostly from Montane Rain Forest. In Chiapas, *P. altissima* occurs between 200–1350 m, mostly in Tropical to Montane rain forests; *Pteris orizabae* occurs between (1600) 2000–3000 m, mostly in Montane Rain Forest and Evergreen Cloud Forest. Thus, the two species may (but probably seldom do) grow together in Montane Rain Forest. The spores of one of the specimens in question (*24028*) appear completely malformed, suggesting a hybrid origin for the plant; however, two other of the collections (*25462*; *33621*) have normal-appearing spores. Some of the "problem" collections approach closely specimens identified as *P. deflexa* Link (syn. *P. polita* Link, *P. propinqua* J. G. Agardh), from southern Central America and South America. The relationships of *P. deflexa*, especially with regard to *P. orizabae*, need to be investigated for a fuller understanding of the problem specimens from Chiapas. Another closely related species is *P. costaricensis* Ros.

10. **Pteris paucinervata** Fée, Mém. Fam. Foug. 8:73. 1857.

—Type: Mexico [Veracruz], near Mirador, Barranca de San Martín, *Schaffner 152* (P!).

Illustration: Scamman (1961:197, penultimate segment).

Rhizome short, erect; fronds to ca. 100 cm long, with reddish-brown stipe as long as or slightly longer than blade, 2–4 mm diam., glabrous; blade pinnate-pinnatifid, with a deeply pinnatifid terminal pinna; lateral pinnae few, (1) 3–7 pairs, lowermost pinnae largest, to ca. 20 cm long, 7 cm wide, some specimens with basal basiscopic segment elongate, pinnatifid, the basal pinnae thus bipartite; ultimate segments oblong to broadly lanceolate, rounded to acute at tip, subfalcate, decurrent, larger ones to 1 cm broad, crenate toward apex; veins free, simple or 1–2-forked, widely spaced at their base (to ca. 5 mm apart); leaf tissue chartaceous, glabrous; sori along middle half to two-thirds of segments.

In Montane Rain Forests, rarely Evergreen Cloud Forest; uncommon in s Sierra Madre, Northern and Eastern highlands, se corner of Central Plateau; 800–2600 m. Southern Mex. (Ver., Oax.), Nic., C.R., Pan. Chiapas Collections: *G 380* (YU); *EM 2949* (K, MEXU, US); *EM 2449* (US); *22661*; *31875*; *32604*; *33111*; *35133*; *38837*; *41710*; *42724*.

Scamman (1961) suggested that this species might be a hybrid between *P. pungens* and *P. muricella*, but there is no good evidence for this. In Chiapas it occasionally grows with *P. muricella*, but never with *P. pungens*; the spores of *P. paucinervata* appear well formed. Morphologically it does not appear close to either species suggested by Scamman, but I am unable to suggest to what it is closely related.

Specimens from the southern Sierra Madre differ from the other Chiapas collections in having smaller, more numerous pinnae, with the lowermost pinnae bipartite. Further studies may show two species to be involved.

11. **Pteris podophylla** Swartz, J. Bot. (Schrader) 1800(2):67. "1801" [1802].

—*Lonchitis pedata* L., Sp. Pl., ed. 2, 2:1536. 1763 (not *Pteris pedata* L.). —*Litobrochia podophylla* (L.) Presl, Tent. Pterid. 149. 1836. —Type: Jamaica, *P. Browne* (LINN 1249.1).

Illustrations: Tryon (1964: 203); Hooker, Garden Ferns pl. 55. 1862.

Rhizome erect, massive; fronds (0.75) 2–3 (5) m long, stipe as long as or longer than blade (to ca. 2 m long), 2 cm diam.; blade 3–5-pinnate, tripartite at base, the two lateral divisions 3–5-partite, central one pinnate-pinnatifid, fronds thus subpalmately branched at base and appearing fan-shaped in outline; penultimate segments sessile to short-stalked, pubescent with ferruginous multicellular hairs on veins and costae beneath, sometimes glabrescent, pinnatifid, basal basiscopic segments usually shorter than basal acroscopic segment; sinuses broad (often nearly as broad as segments), rounded; venation areolate, with a single areole with its long axis parallel to costa between adjacent costules; $2n$ = ca. 58 (Jam.).

Nearly always in Montane Rain Forest; locally common in Northern Highlands (especially Jitotol Ridge), Sierra Madre, widely scattered in the Central Plateau; 1200–2200 m. Southern Mex. (Ver., Oax.), Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz.); Gr. Antill. CHIAPAS COLLECTIONS: *R 841* (PH); *Li 1539* (K); *GM 145* (DS); *G 358* (YU); *C&D 220* (US); *G 358 + A* (YU); *23103*; *24097*; *26077*; *31694*; *31965*; *32365*; *34623*; *35138*.

12. **Pteris pulchra** Schlecht. & Cham., Linnaea 5:614. 1830.

—TYPE: Mexico, Veracruz, between Misantla and Colipa, *Schiede & Deppe* [787] (probable isotypes at BM! K!).

Pteris arborescens Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):54. 1842. —TYPE: Mexico, Oaxaca, Chinantla, *Galeotti 6375* (BR—2 sheets, photos BM!; isotypes BR!).

Litobrochia mexicana Fée, Gen. Fil. 136. 1852. —*Pteris mexicana* (Fée) Fourn., Mex. Pl. 1:117. 1872. —TYPE: Mexico, Oaxaca, *Galeotti 6376* (P!; isotypes BR—6 sheets!, K! US!).

ILLUSTRATION: Rovirosa, Pterid. Sur Mex. pl. 20. 1909.

Rhizome stout; fronds 1–2 m long, stipe about as long as blade or longer; blade bipinnate to tripinnate at base, lowermost pinnae largest (to 60 cm long), basal basiscopic pinnule greatly enlarged, fully pinnate, to 45 cm long; secondary pinnae 1-pinnate or simple, up to ca. 10 pairs; ultimate segments narrowly elliptic, sessile to stalked ca. 5 mm, mostly 10–25 cm long, 2–3 cm wide, tapering at both ends, the tip sterile, entire or minutely serrulate; venation areolate, costal areoles short and broad, those toward the margin longer with their long axis perpendicular to costa, at the margin ca. 20 veins per 1 cm; leaf tissue below glabrous to minutely appressed-pubescent.

In Lower Montane and Montane rain forests; uncommon in Northern and Eastern highlands; 800–900 m. Southern Mex. (Hgo., Ver., Gro., Oax.), Guat., Nic.; S.A. (Col.). CHIAPAS COLLECTIONS: *R 850* (PH); *Li 1521* (BR, K); *31237*; *33075*.

Pteris pulchra is very close to *P. haenkeana* Presl, occurring from Colombia to Bolivia and in Brazil. Our species apparently differs in the thinner blades and the smaller (narrower and shorter) pinnae and pinnules.

13. **Pteris pungens** Willd., L. Sp. Pl., ed. 4, 5:387. 1810.

—LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:144. 1977): Plumier's Tract. Fil. Amer. pl. 14, 1705, illustrating a collection from along La Grande Rivière, near Léogane, Haiti.

ILLUSTRATIONS: Tryon (1964:198); Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 4, figs. 4, 6. 1897 (as *P. nemoralis*).

Rhizome erect, caudex ca. 2–3 cm diam.; fronds to 1.4 (2) m long, the weakly aculeate stipe equaling blade or longer; blade pentagonal-oblong, 30–60 cm long, 30–50 cm broad, pinnate-pinnatifid with a conform pinnatifid terminal pinna, lowermost pinnae bipartite with basal basiscopic pinnules elongate and deeply pinnatifid; pinnae 2–5 pairs, axils aculeolate, 20–35 cm long, 4–8 cm broad, abruptly caudate, the tip 1.5–10 cm long, 3–5 mm broad; segments linear-oblong, slightly oblique, straight or subfalcate, those at base of pinnae evenly reduced (sometimes obsolete on basiscopic side); veins free, elevated, mostly 1-forked, 1–2 basal ones arising from costa; leaf tissue glabrous or nearly so below.

In Tropical Rain Forest; uncommon in E edge of Northern Highlands, Eastern Highlands, s Pacific Coastal Plain; 200–300 m. Southern Mex. (Chis. only), Bel., Hond., Nic., C.R., Pan.; S.A. (Gui., Ecu., Bol.); Antill., Trin. CHIAPAS COLLECTIONS: *P 6729* (UC, US); *S 1693* (MEXU, US); *Me 2033* (K); *34067*; *34996*.

14. **Pteris quadriaurita** Retz., Obs. Bot. 6:38. 1791.

—TYPE: Ceylon, *König* (LD).

Pteris nemoralis Willd. var. *major* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):53. 1842. —TYPE: Mexico [Veracruz], Zacuapan, *Galeotti 6291* (BR—6 sheets!).

ILLUSTRATIONS: Hooker, Sp. Fil. 2:pl. 134B. 1858; Bot. Mag. 86:pl. 5183. 1860; Tryon (1964:198); Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 4, figs. 2, 3, 5. 1897.

Rhizome erect or suberect; fronds 0.5–1.5 (2) m long, stipe about as long as blade; blade to 1 m long, 50 cm broad, pinnate-pinnatifid with a conform pinnatifid terminal pinna; pinnae 7–15 pairs, deeply pinnatifid except for a short-caudate tip (1–3 cm); basal pinnae 2-partite, each with a single (rarely 2), greatly enlarged, basal, basiscopic, pinnatifid pinnule; ultimate segments oblong, rounded at tip; leaf tissue firm-herbaceous, glabrous or sparingly hairy below; veins free, simple or 1-forked, lowermost pair of each segment reaching margin above sinus; $n = 87$, $2n = 87$, apogamous (Jam., Nepal).

Stream banks, wet roadbanks and ditches, and margins of Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; very common in the Northern Highlands and Sierra Madre, also Eastern Highlands, E portion of Central Plateau, edge of Central Depression, Pacific Coastal Plain; 200–1700 m. Southern Mex. (Jal., Méx., Gro., Oax., S.L.P., Ver.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. to Ven. and NW Arg., Braz.); Antill.; also Afr. and Asia. CHIAPAS COLLECTIONS: *R 834* (PH); *G 396* (K, PH); *GM 28* (DS); *EM 200* (DS, MEXU); *G 402* (K); *21628*; *21759*; *22175*; *22297*; *22486*; *22552*; *23111*; *23328*; *24034*; *24923*; *30556*; *31324*; *31496*; *31599*; *32167*; *32569*; *32677*; *33060*; *33157*; *33378*; *33726*; *38007*; *39057*; *41937*; *42455*.

Pteris quadriaurita is here recognized in a broad sense. Walker (Evolution 12: 91. 1958; Trans. Royal Soc. Edinburgh 66:201. 1966) restricted the application of the name to sexual, diploid plants from southern India and Ceylon, in which case another name is needed for Neotropical material.

Several collections of *P. quadriaurita* from the Eastern Highlands and the southeastern corner of the Central Plateau bear buds on the upper side of the rachis (e.g., *22175, 32167*; *33060*; *33157*). Whether these are effective in reproducing the species is not known. Those specimens with buds are not otherwise distinguishable from non-proliferous collections.

89. SACCOLOMA

Saccoloma Kaulf., Berlin Jahrb. Pharm. Verbundenen Wiss. 21:51. 1820. —Type: *Saccoloma elegans* Kaulf.
Orthiopteris Copel., Bernice P. Bishop Mus. Bull. 59:14. 1929. —Type: *Orthiopteris ferulacea* (Moore) Copel. [≡*Davallia ferulacea* Moore].

Plants terrestrial; rhizome stout, erect, dictyostelic, with dark, sclerotic scales and some hairs; fronds large, polystichous, simply pinnate to quadripinnate, acroscopically developed, glabrous or nearly so; axes adaxially grooved, grooves continuous from one axis to the next; veins free, simple or obliquely branched, prominent; sori terminal on veins. submarginal, adherent laterally, outer lobe of leaf tissue unmodified to definitely modified, indusium conical to cup-shaped, its outer margin more or less entire to strongly rostrate; spores tetrahedral-globose, light tan, translucent, with low, narrow, sharply defined, anastomosing ridges, the ridges somewhat parallel to commissural ridges on proximal face; x = ca. 63?

A genus of about 11 species, from Madagascar (1), Malesia and the Pacific Basin (7), and the Neotropics (3). The Neotropical species occur in deep, wet forests, at middle elevations. The base chromosome number for the genus is still uncertain. Walker (1966) obtained $n = 188$ for *S. domingense*; I have counted n = ca. 63 for *S. inaequale,* the sole Mexican species. The affinities of *Saccoloma* are uncertain, perhaps with the dennstaedtioid ferns.

Reference: Tryon, R. M. 1962. Taxonomic fern notes. III. Contr. Gray Herb. 191:91–107.

1. **Saccoloma inaequale** (Kunze) Mett., Ann. Sci. Nat. Bot. (4)15:80. 1861.

—*Davallia inaequalis* Kunze, Linnaea 9:87. 1834. —*Ithycaulon inaequale* (Kunze) Copel., Univ. Calif. Publ. Bot. 16:80. 1929. —*Orthiopteris inaequalis* (Kunze) Copel., Gen. Fil. 50. 1947. —Type: Peru, Maynas ad Yurimaguas, *Poeppig* [Diar. 2113] (LZ, destroyed; isotypes B, GH).
Microlepia galeottii Fée, Gen. Fil. 327. 1852. —Type: Mexico, Teotalengo, *Galeotti 6526* (presumably P).
Illustrations: **Fig. 75**; Hooker, Sp. Fil. 1:pl. 57. 1845; Tryon, Contr. Gray Herb. 194:33, fig. 10. 1964.

Caudex to 30 cm long; fronds mostly (0.3) 1–2 m long, stipe stout, to 1.7 cm diam., castaneous, often lighter distally, deciduously scaly toward base; blade deltoid, (0.2) 0.6–1 m long, (6) 40–90 cm broad, 3–4-pinnate, sterile fronds often larger and slightly less dissected than the fertile; rachis subterete, olivaceous to stramineous, glabrate; pinnae alternate, oblique, petiolate, the large basal ones deltoid, inequilateral, (5) 25–50 (65) cm long, 15–35 cm broad at base; upper pinnae gradually smaller and narrower, mostly lance-deltoid; secondary pinnae, pinnules, and segments strongly anadromous, stalked, acroscopic basal ones larger than basiscopic ones; segments oblique, lance-deltoid to obliquely oblong, mostly 1–2 cm long, crenate-serrate to obliquely lobed, sessile, or the upper adnate-decurrent; indusia free only at the truncate apex, submarginal, shorter than the unmodified margin; $n = 63 \pm 2$ (Chis.).

In Montane Rain Forest; uncommon in Northern Highlands (Jitotol Ridge), Sierra Madre, se Central Plateau; 1300–2100 m. Southern Mex. (Ver., Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., s Braz.); Antill. Trin. Chiapas Collections: *P 6860* (UC, US); *P 7235* (UC, US); *P 7254* (UC, US); *GM 30* (DS); *T&L 41648* (DS); *21519*; *25374*; *31996*; *32208*; *32385*; *32628*; *34369*.

Species to be Looked for in Chiapas

Saccoloma elegans Kaulf. —known from Bel., Guat., Nic., C.R., Pan.; S.A. (Col. to Bol. and Fr. Gui., Braz.); Jam., Cuba, Hisp., Trin. Distinguished by its simply pinnate fronds, the pinnae entire; sori on adjacent vein ends; indusia lunate, broad.

90. SALVINIA

Salvinia Adanson, Fam. des Plantes 2:15. 1763. —Type: uncertain, usually said to be *Salvinia natans* (L.) All. [≡*Marsilea natans* L.].

Floating aquatics with erect vernation; roots absent; rhizome horizontal, slender, branched, bearing leaves in whorls of three, of which two are green, flattened, entire, and floating, the third leaf finely dissected, pendent, substituting for a root; floating leaves small, usually less than 2 (3) cm long, with a distinct midrib and reticulate venation, often emarginate, bearing numerous papillae on upper surface and unicellular septate castaneous hairs on lower surface; plants monoecious and heterosporous, bearing sori in clusters on pendent dissected leaves, these leaves covered with castaneous or darkened septate hairs; megasporangiate sori one or two, with relatively few megasporangia, each producing 32 spores of which only one matures; microsporangiate sori many, each with numerous microsporangia (smaller than the megasporangia) containing 64 trilete microspores, the microspores shed as a unit; sporangia of both kinds surrounded by a membranous basifixed translucent indusium and borne on a branched filamentous receptacle; $x = 9$.

About 10 species, distributed primarily in the Neotropics (6 species) and Africa (including Madagascar), but with 2 species occurring in tropical Asia. All species occur in stagnant lakes and pools of fresh water, at low to middle elevations. The affinities of *Salvinia* are with *Azolla,* but otherwise uncertain because of the highly modified nature of the vegetative and reproductive structures. For this reason, the two genera are usually placed in their own order.

References: Herzog, T. K. J. 1935. Ein Beitrag zur Systematik der Gattung *Salvinia*. Hedwigia 74:257–284; Weatherby, C. A. 1937. A further note on *Salvinia*. Amer. Fern J. 27:98–102; Sota, E. de la 1962. Contribución al conocimiento de las "Salviniaceae" neotropicales. I. *Salvinia oblongifolia* Martius; II. *Salvinia auriculata* Aublet; III. *Salvinia herzogii* nov. spec. Darwiniana 12:465–520.

Hairs at the tips of the papillae on the upper surface of the floating leaves joined together into a darkened knot at their tips; sori stalked. . . . . 1. *S. auriculata*
Hairs at the ends of the papillae spreading, not united; sori sessile . . . . 2. *S. minima*

1. **Salvinia auriculata** Aubl., Hist. Pl. Guiane Franç. 2:969, pl. 367. 1775.

—Type: French Guiana, "in territorio Caux," *Aublet* (presumably P).

Salvinia rotundifolia Willd., L. Sp. Pl., ed. 4, 5:537. 1810. —Type: Brazil, *Hoffmannsegg s.n.* (B—Herb. Willd. 20250). See Morton, Contr. U.S. Natl. Herb. 38:77. 1967.

Illustrations: **Fig. 13**; Sota (1962:509–513); Aublet, Hist. Pl. Guiane Franç. 4:pl. 367. 1775; Fritel, J. Bot. (Morot) 21:192, 196, 197. 1908.

Differing from *S. minima* by the characters mentioned in the key; in addition, it is usually a somewhat larger species, with blades up to 3 cm long, tending to become yellowish or brownish when dried; $2n = 45$.

Floating in marshes surrounding Laguna de Catazaja: Gulf Coastal Plain; also Río Nancinaja below Río Arriba, low dry area of Northern Highlands; 125 m. Southern Mex. (Tam., Mich., Gro., Oax., Ver., Tab.), Guat., Salv., Hond., Nic., Pan.; S.A. (Ven. to n Arg., Urug., and Bol.); Gr. Antill. Chiapas Collections: *J 1336* (US); *34932*.

2. **Salvinia minima** Baker, J. Bot. 24:98. 1886.

—Type: Brazil, Santa Catarina, *Müller 479* (BM, according to Sota, Bol. Soc. Argent. Bot. 17:49. 1976).

Illustrations: N. L. Britton, Fl. Bermuda 428. 1918 [as *S. olfersiana*]; Sota, Darwiniana 12:617–623. 1963; Wherry, Southern Fern Guide 267. 1964 [as *S. rotundifolia*].

Plants mostly ca. 3–7 cm long; rhizome 1–2 mm diam.; floating leaves firm, somewhat conduplicate and short-petiolate, orbicular to slightly oblong, subcordate at base, to 1.5 cm long, 1.5–2 cm broad, bearing on upper side numerous rows of elongate, conical papillae 1–3 mm high, papillae (especially toward midvein of leaves) in turn bearing usually 4 hairs, the hairs free, spreading, hyaline, septate; undersurface of floating leaves with castaneous setae along veins; pendent submerged leaves 3–6 cm long, with numerous castaneous septate setae; macrosori with ca. 25 megasporangia; microsori with over 100 microsporangia.

In still or stagnant fresh water or shores of slow-flowing streams; Pacific Coastal Plain, Central Depression; 0–650 m. Southern Mex. (Tab., Yuc.), Bel., Guat., Hond., Salv., Nic., C.R.; S.A. (to s Braz., Parag., n Arg., and Urug.); Fla. (introduced?), apparently not known from Antill. Chiapas Collections: *Mo 714* (UC, US); *38379*.

The name *S. rotundifolia* Willd. has often been wrongly applied to this species (see Morton, Contr. U.S. Natl. Herb. 38:75. 1967).

91. SCHAFFNERIA

Schaffneria Fée, Mém. Fam. Foug. 7:56, pl. 17, fig. 1. 1857. —Type: *Schaffneria nigripes* Fée.

Plants terrestrial or epipetric; rhizome short, compact, with dark, clathrate scales; stipe black, with short, whitish to tan, appressed hairs, glabrescent; blade round-flabelliform, entire; veins forking and anastomosing to form elongate areoles that are shorter nearest the margin; leaf tissue fleshy, opaque, glabrous; sori linear, throughout blade except at base; indusia whitish to tan, linear, spores oblong-reniform, brown, with a distinct, winged perispore.

A monotypic genus, without close relatives in the New World. Its derivation from *Asplenium* is obvious, and it may be most closely related to *A. delavayi* (Franch.) Copel. from southwest China (Copeland, 1947). Although not directly refuting that *Schaffneria nigripes* and *Asplenium delavayi* might be closely related, Mickel (Brittonia 28:326–328. 1976) believed that the differences between the two were of a magnitude sufficient to justify recognition of a new genus, *Sinephropteris*, for the Chinese plant. Mickel did not suggest affinities within *Asplenium* for either *Schaffneria* or *Sinephropteris*.

Schaffnera Sch.-Bip. (Flora 24:Intell. I, 42, 1841) was cited by Reed (Taxon 4:105–117. 1955) as an earlier homonym of *Schaffneria* Fée; however, *Schaffnera* Sch.-Bip. is a nomen nudum in the place indicated and need not be taken into account for purposes of priority.

1. **Schaffneria nigripes** Fée, Mém. Fam. Foug. 7:56, pl. 17, fig. 1. 1857.

—*Asplenium nigripes* (Fée) Hook., Hooker's J. Bot. Kew Gard. Misc. 9:268, pl. 9. 1857. —*Scolopendrium nigripes* (Fée) Hook., Sp. Fil. 4:3. 1862. —Type: Mexico, collector not stated. At Paris, I have seen *Schaffner 27* and *Müller 22* and *693*, probably all seen by Fée before he described *Schaffneria*.

Illustrations: **Fig. 55**; also Rovirosa, Pterid. Sur Mex. pl. 30. 1909; Mickel, Brittonia 28:327. 1976.

Rhizome scales lanceolate, 2–3 mm long; fronds mostly 2–10 cm long, with stipe of larger fronds as long as or slightly longer than blade, the glossy, black stipe 1–2 mm diam., terminating rather abruptly at blade base; blade 1–5 cm long and wide, round to obovoid; sori to ca. 15 mm long, linear to slightly curved, mostly single, occasionally paired (scolopendrioid, i.e., on adjacent, close veins with indusia opening towards each other).

On moist rocks or stream banks (also epiphytic on mossy trunks?), Seasonal Evergreen Forest, Lower Montane and Montane rain forests, or Pine-Oak-Liquidambar Forest; uncommon in Northern and Eastern highlands, interface of s Sierra Madre and Central Depression; 800–1350 m. Southern Mex. (Tam., S.L.P., Ver., Oax.), Guat.; Cuba. CHIAPAS COLLECTIONS: *G 302* (K, NY); *R 1088* (not seen, cited by Rovirosa, Pterid. Sur Mex. 84. 1909); *Voorhies 70-19* (DS); *29133*; *29757*; *29889*; *38187*.

92. SCHIZAEA

Schizaea J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:419. 1793 (nom. cons.). —TYPE (implicit in Smith's publication; see Webbia 12:6. 1956): *Schizaea dichotoma* (L.) J. E. Smith [≡*Acrostichum dichotomum* L.].

Lophidium L. C. Richard, Actes Soc. Hist. Nat. Paris 1:114. 1792 (nom. rejic.). —TYPE: *Lophidium latifolium* L. C. Richard = *L. elegans* (Vahl) Presl.

Plants terrestrial; rhizome solenostelic, densely clothed with septate hairs; fronds caespitose, erect or ascending, stipitate; stipe with a single C-shaped vascular strand, septate-hairy at base; blade linear or usually once to repeatedly dichotomous, or flabelliform; veins free; sporangia sessile in 2 rows on branches of compact, recurved, pectinate-pinnate distal segments (sporangiophores) of blade or branch of blade; sporangia pyriform or oblong, with a transverse annulus, composed of a ring of thickened cells; spores bilateral, monolete, 128–256 per sporangium; gametophytes filamentous and partly green; $x = 77$?

About 28 species, distributed pantropically, with a few species in temperate regions. The preponderance of species in the New World occurs in the Amazonian region and adjacent areas; a single species is known from Chiapas. Species of *Schizaea* are found in diverse lowland habitats, from primary forests to sphagnum bogs to meadows to sandy areas, or on decayed wood.

Actinostachys, with digitate fertile segments and the sporangia in four rows instead of two, is closely related to *Schizaea,* but is often treated now as a distinct genus on the basis of differences in gametophytes (subterranean, axial) and embryos. At least one species of *Actinostachys, A. germanii* Fée, is known from Guatemala and may be expected in Chiapas.

REFERENCES: MAXON, W. R. 1909. Schizaeaceae. Pp. 31–52 *in* North American Flora 16; Lellinger, D. B. 1969. The botany of the Guayana Highland—Part VIII. Schizaeaceae (Filicales). Mem. New York Bot. Gard. 18:2–11.

1. **Schizaea elegans** (Vahl) Swartz, J. Bot. (Schrader) 1800(2):103. "1801" [1802].

—*Acrostichum elegans* Vahl, Symb. Bot. 2:104, pl. 50. 1791. —*Lophidium elegans* (Vahl) Presl, Suppl. Tent. Pterid. 77. "1845" [1846]. —TYPE: Trinidad, *von Rohr s.n.* (C!).

ILLUSTRATIONS: Engler & Prantl, Nat. Pflanzenf. 1(4):362. 1900; J. Smith, Ferns Brit. & For. 262. 1866; Vareschi, Fl. Venez. 1(1):pl. 37. 1969; Stolze, Fieldiana, Bot. 39:40. 1976.

Rhizome ascending or horizontal, densely covered with yellowish to brownish septate hairs; fronds several, fasciculate, 25–50 (70) cm long, rigidly erect; stipe angled, sulcate and brownish in lower part, to ca. 50 cm long, 4 mm diam., base with 2–4-celled uniseriate hairs; blade flabelliform, 10–20 cm long, 15–30 cm broad, 2–6 times dichotomously cleft, the divisions variable, linear to narrowly obdeltoid, pluricostate, apices deeply and usually irregularly fimbriate-dentate, or sharply lacerate by the production of prominent costae; sporangiophores numerous, terminal upon many of the elongate costae, recurved, conduplicate, 6–10 mm long; fertile segments 10–15 pairs, slender, lower ones 2.5–5 mm long, upper ones gradually shorter, conspicuously pilose with fine tan flexuose hairs upon costa and margins; sporangia in 2 series on each fertile segment; spores minutely verrucose.

In Tropical Rain Forest?; rare in Gulf Coastal Plain; low elevation. Southern Mex. (Oax., Ver.), Bel., Guat., Nic., C.R., Pan.; S.A. (to Bol. and s Braz.); Gr. Antill., Trin. CHIAPAS COLLECTION: *EM 3662* (MEXU, US).

93. SPHAEROPTERIS

Sphaeropteris Bernh., J. Bot. (Schrader) 1800(2):122. "1801" [1802]. —TYPE: *Sphaeropteris medullaris* (Forst.) Bernh. [≡*Polypodium medullare* Forst.].

For additional synonymy, see Tryon, 1970.

Plants arborescent; fronds very large, 2-pinnate or more divided; stipe smooth to tuberculate or with corticinate spines; stipe scales structurally conform, cells of body all similar in their orientation and shape, and (usually) in their size and color; scale margins often with cilia, teeth, or dark setae; minute indument of stipe, when present, of trichomidia and (or) squamulae; costae above pubescent, rarely glabrous; veins free, in lobed or pinnatifid segments the basal vein on each side extending above base of sinus; indusia absent, or present and hemitelioid to sphaeropteroid (globose), or formed of several closely investing scales; $x = 69$.

According to Tryon (1970), a genus of about 120 species, about 20 American, the rest from India and Southeast Asia through the Pacific. Two species occur in southern Mexico and one in the Greater Antilles; most of the remaining American species are South American. Tryon (1970) argued that the most primitive element in Cyatheaceae was *Sphaeropteris* and that the other scaly cyatheoid genera evolved from it. One of the Mexican species, *S. horrida,* is believed to have close affinities to such species as *S. medullaris* of New Zealand and *S. concinna* of New Guinea (Tryon, 1971).

REFERENCES: TRYON, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53; 1971. The American tree ferns allied to *Sphaeropteris horrida*. Rhodora 73:1–19; Windisch, P. G. 1977. Synopsis of the genus *Sphaeropteris* (Cyatheaceae) with a revision of the neotropical exindusiate species. Bot. Jahrb. Syst. 98:176–198.

Stipe base scales brown, glossy; pinnules short-stalked .... 2. *S. myosuroides.*
Stipe base scales stramineous or tan, dull; pinnules mostly sessile .... 1. *S. horrida*

1. Sphaeropteris horrida (Liebm.) Tryon, Contr. Gray Herb. 200:20. 1970.

—*Cibotium horridum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:279. 1849. —LECTOTYPE (chosen by Tryon, 1971:11): Mexico, Oaxaca, Chinantla, "pr. Teotalcingo," *Liebmann* [Liebm. Pl. Mex. 2086, Fl. Mex. 873] (C!—folio); isolectotype C! (Fl. Mex. 871).

Cyathea princeps E. Mayer, Gartenfl. 17:10. 1868. —SYNTYPES: described from cultivated plants grown in Brussels, originally collected by *Linden* in Mexico, Veracruz, Volcán Tuxetla and also from Chiapas (authentic material not seen by Tryon, 1971).

Cyathea bourgaei Fourn., Mex. Pl. 1:135. 1872. —LECTOTYPE (chosen by Tryon, 1971): Mexico, Veracruz, Valle de Cordoba, *Bourgeau 2200* (isolectotypes at GH, K!, NY, P).

Cyathea glauca Fourn., Mex. Pl. 1:135. 1872 (not Willd., 1810). —TYPE: Mexico, Orizaba, *Bourgeau 2794* (isotype P).

Cyathea munchii Christ, Bull. Herb. Boissier (2)7:413. 1907. —TYPE: Mexico, Chiapas, "San Cristobal" ["Zontehuitz" on DS collection], *Münch 64* (presumably P, not found by Tryon; isotypes DS—2 sheets! fragm. US). The "1986" cited by Christ and Tryon (1971) is probably an error for the date of collection (1906?); Münch collected fewer than 200 numbers.

ILLUSTRATIONS: Tryon (1971:2, figs. 5–8); Stolze, Fieldiana, Bot. 39:121, fig. 24, a–c. 1976.

Trees with stems to 5 or more (15) m tall, 15 (40) cm diam.; fronds ca. 3 (5) m long; stipe lacking spines, densely scaly at base, muricate distally from persistent scale bases, scales stramineous to tan, 1–3 (4) cm long, with castaneous, regular, marginal, antrorse to patent teeth; blade deeply 2-pinnate-pinnatifid to nearly 3-pinnate, most pinnules sessile or with basal basiscopic segment adnate, largest pinnules short-stalked; ultimate segments entire; rachis, costae, and costules below with stramineous to castaneous marginally-toothed scales; veins simple to mostly 1 (2)-forked; leaf tissue glabrous, glaucous to greenish; immature indusia sphaeropteroid, without an apical umbo, at maturity a deep urn or cup, ultimately splitting into 2 to few segments, tan, opaque; receptacle ± clavate, with or without paraphyses.

Edges of Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands, Sierra Madre, Central Plateau?; 1000–1400 m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic. CHIAPAS COLLECTIONS: *P 9197* (F, GH, MO, NY, UC, US, only the last two seen, the others cited by Tryon, 1971); *P 10249* (UC); *P 10588* (US); *P 349* (US); *GM 64* (DS); *25119*; *31612*; *32474*; *36654*.

2. Sphaeropteris myosuroides (Liebm.) Tryon, Contr. Gray Herb. 200:20. 1970.

—*Alsophila myosuroides* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:286. 1849. —TYPE: Mexico, Oaxaca, "inter Lacoba et Teotalcingo," *Liebmann* [Liebm. Pl. Mex. 2081, Fl. Mex. 514, 902, 905, 906, 907, 908]; "inter Lacoba and Jocotepec," *Liebmann* [Liebm. Pl. Mex. 2081, Fl. Mex. 512, 513, 903, 904] (all collections C! 902–907 folio herb.; isotypes K—4 sheets! "Lacoba"; US). It is uncertain whether this represents one or two gatherings.

ILLUSTRATIONS: Maxon, Annual Rep. Board Regents Smithsonian Inst. 1911:pl. 10 C; Tryon (1970:19, fig. 17, scale); Stolze, Fieldiana, Bot. 39:121, fig. 24, d–e. 1976.

Trees with stems 2–5 m tall, ca. 10 cm diam.; fronds 1.5–4 m long; stipe aculeate (spines 1–2 mm long, thin) toward base, scaly, scales bright brown, glossy, to 3 cm long, with brown, marginal teeth; blade deeply 2-pinnate-pinnatifid to barely 3-pinnate, most pinnules of larger pinnae stalked 1–5 mm; ultimate segments crenate-serrate; rachis, costae, and costules beneath with stout, stiff, septate, falcate hairs, without scales or costules with a few, flat, ovate, tan, long-ciliate scales; veins mostly 1-forked; leaf tissue glabrous, greenish; indusia lacking; receptacles clavate; paraphyses numerous, flaccid, persistent.

In Montane Rain Forest; uncommon in Northern and Eastern highlands; 800 m. Southern Mex. (Ver., Oax., Tab.), Bel., Guat., Isla Providencia, Hond., Nic.; Cuba. CHIAPAS COLLECTIONS: *S&S 5375* (436) (US!); *21836*; *33024*.

94. SPHENOMERIS

Sphenomeris Maxon, J. Wash. Acad. Sci. 3:144. 1913 (nom. cons.). —TYPE: *Adiantum clavatum* L. [≡*Sphenomeris clavata* (L.) Maxon].

Plants terrestrial or epipetric; rhizome slender, long-creeping, protostelic or solenostelic, densely covered with dark, linear, hairlike scales (2 to few cells wide at base), or septate hairs; fronds determinate, ± distichous; stipe adaxially sulcate; blade 3–4 times obliquely pinnate or pinnatifid, anadromous, ultimate segments linear or spatulate, cuneate at base, truncate at tip; rachis smooth (not spiny); veins few, forking, free; sori borne at or near distal margin of segments, single or 2–4 joined; indusia flattish, pocketlike, attached at base and sides, single at the clavate apices or borne along a common transverse receptacle; sporangia often few per sorus, sometimes mixed with paraphyses; spores trilete or monolete; $x = 38$, 48, and possibly others.

According to Kramer (1971), a genus of 11 species; three occur in the Neotropics, two in Africa, and the rest in Asia and Polynesia. The affinities of *Sphenomeris* are apparently with *Lindsaea* and especially *Odontosoria*.

REFERENCES: KRAMER, K. U. 1957. A revision of *Linsaea* in the New World, with notes on allied genera. Acta Bot. Neerl. 6:97–290; 1971. *Lindsaea* group. Pp. 177–254 *in* Flora Malesiana, ser. II —Pteridophyta, vol. 1, pt. 3.

1. **Sphenomeris clavata** (L.) Maxon, J. Wash. Acad. Sci. 3:144. 1913.

—*Adiantum clavatum* L., Sp. Pl. 2:1096. 1753. —*Stenoloma clavatum* (L.) Fée, Gen. Fil. 330. 1852. —*Odontosoria clavata* (L.) J. Smith, Hist. Fil. 264. 1875. —TYPE: uncertain, based in part on Plumier's Tract. Fil. Amer. 101, fig. B, 1705, and Descr. Pl. Amer. pl. 50, fig. B, 1693.

For additional synonymy, see Maxon, Sci. Surv. Porto Rico 6:487. 1926.

ILLUSTRATIONS: **Fig. 49**; Small, Ferns SE States 318. 1938.

Fronds 20–60 cm long, with stipe slender (1 mm diam. or less), mostly shorter than blade, stramineous from a darker base, glabrous; blade 10–35 cm long, 3–15 cm broad, 3–4-pinnate, rachis stramineous, subflexuous; ultimate divisions distant, linear-cuneate, mostly 10–15 mm long, 1–4 mm broad at apex, sides entire, the truncate apex sharply dentate if sterile; leaf tissue yellowish green, glabrous; indusia erose-dentate; spores globose with a trilete scar, brownish; $n = 39$ (Fla.), 38 (Jam.).

Usually on limestone throughout its range, known in Chiapas by a single collection in Tropical Rain Forest, adjacent to small cascading river at water's edge; rare in E end of Northern Highlands (Agua Azul near Palenque); 300 m. Otherwise known only from S Fla., Bah. Is., and Gr. Antill. CHIAPAS COLLECTION: *35362*.

A remarkable new range extension for this peculiar species. The other two Neotropical species are known only from Colombia (Kramer, 1957).

95. STICHERUS

Sticherus Presl, Tent. Pterid. 51. 1836. —LECTOTYPE (chosen by Christensen, Ind. Fil. liv. 1906): *Sticherus laevigatus* (Willd.) Presl [≡*Mertensia laevigata* Willd.] = *S. truncatus* (Willd.) Nakai.

Rhizome wide-creeping, scaly; fronds typically pinnate or bipinnate and further dichotomously divided, without stipular appendages where the rachis forks; foliar segments on ultimate axes and usually on one to several preceding ones; veins mostly 1-forked at or near base; sori few per sorus, most commonly 3–5 (6) borne on anterior branch; $x = 34$.

According to Copeland (1947), *Sticherus* comprises about 100 species, distributed pantropically; there are perhaps 25 species in the Neotropics, with the center of diversity in southern Central America and Andean South America and southern Brazil. Most species grow in disturbed or semidisturbed habitats, such as along roadbanks.

Sticherus is evidently most closely related to *Diplopterygium* and *Gleichenia,* less so to *Dicranopteris*. Together, they comprise the relatively primitive Gleicheniaceae.

REFERENCE: MAXON, W. R. 1909. Gleicheniaceae. Pp. 53–63 *in* North American Flora 16(1).

a. Segments densely and evenly arachnoid- to lanate-pubescent beneath.
  b. Scales on costae below copious, orangish to tan, long-ciliate, 1–2 mm long, similar scales abundant in axils .... 1. *S. bifidus*
  bb. Scales on costae below essentially lacking, or scattered, dark brown to blackish or streaked with black, often setose, less than 1 mm long; axillary scales dark brown to blackish, rigid, mostly short-ciliate to setose .... 2. *S. brevipubis*
aa. Segments not arachnoid- or lanate-pubescent below, sparsely hairy or glabrous.
  c. Costae below with rather dense, orangish, long-ciliate scales; pinnae usually less than 3.0 (3.5) cm broad .... 4. *S. underwoodianus*
  cc. Costae below lacking scales or with relatively few scattered scales (ours), these short-ciliate; pinnae usually greater than (3.0) 3.5 cm broad .... 3. *S. palmatus*

1. **Sticherus bifidus** (Willd.) Ching, Sunyatsenia 5:282. 1940.

—*Mertensia bifida* Willd., Kongl. Vetensk. Acad. Nya Handl. 25:168, pl. 5, fig. B. 1804. —*Gleichenia bifida* (Willd.) Spreng., Syst. Veg., ed. 16, 4:27. 1827. —*Dicranopteris bifida* (Willd.) Maxon, *in* No. Amer. Fl. 16(1):60. 1909. —TYPE: Venezuela, "ad Caracas," *Bredemeyer s.n.* (B—Herb. Willd. 19468).

Mertensia fulva Desv., Mém. Soc. Linn. Paris 6:201. 1827. —*Dicranopteris fulva* (Desv.) Underw., Bull. Torrey Bot. Club 34:255. 1907. —TYPE: Jamaica, Blue Mts., collector not stated (P—photo BM!).

ILLUSTRATIONS: see original; also Vareschi, Fl. Venez. 1(1):pl. 39. 1969; Stolze, Fieldiana, Bot. 39:47, fig. 11 d. 1976.

Plants suberect or ascending, forming extensive thickets; rhizome 3–4 mm diam., sparingly scaly; stipe at first erect, eventually declining, light greenish brown, base darker and deciduously chaffy, above covered at first with pallid, rusty, ciliate scales, these extending to main vascular parts of lateral branches, imperfectly deciduous; primary lateral branches 2 or several pairs, once or twice pseudodichotomous, a secondary axis very rarely developed; primary internode of larger lateral branches 2.5–7 cm long, wholly naked or usually imperfectly pectinate upon upper side and naked below, segments commonly much reduced, mostly appearing as short triangular lobes, lower side almost invariably naked; secondary internodes 3.5–11 cm long, sometimes naked on both sides, more commonly pectinate throughout on both sides, the several pairs of basal segments frequently much reduced (especially on inner side); pinnae 30–55 cm long, 3–7 cm broad, usually somewhat arcuate, attenuate, fully pectinate or rarely naked for 1–2 cm at outer base, included bud with pale rusty or rarely somewhat castaneous scales, rachises lustrous, chaffy, scales rusty, spreading, imperfectly deciduous; segments linear from a dilate base, slightly connected, straight or subfalcate, acutish or obtuse, covered below with rusty tomentum, this usually quite obscuring venation, or with age whitish and densely matted, sometimes disappearing; margins revolute; veins 18–35 pairs, elevated below, scarcely evident above; sori 3–4 (rarely 5)-sporangiate, inframedial, appearing imbedded in tomentum covering segments; $n = 34$ (Chis., P.R., Jam.).

Along road embankments, edges of Pine-Oak-Liquidambar Forest, Montane Rain Forest; common in Northern Highlands, Central Plateau, s Sierra Madre, uncommon in Gulf Coastal Plain; (150) 800–1700 m. Southern Mex. (Jal., Oax., Ver.), Guat., Salv., Hond., Nic., C.R.; S.A. (Col. to Fr. Gui. and Bol., Braz.); Antill., Trin. CHIAPAS COLLECTIONS: *G 392* (YU); *R 849* (PH); *T&L 41590* (DS); *15016*; *21003*; *21835*; *22221*; *23135*; *23326*; *28114*; *29641*; *31607*; *32236*; *32368*; *32471*; *34600*; *34919*; *36651*; *42092*.

Mertensia gleichenioides Liebm. (type from Veracruz, Cuapa, Liebm. Pl. Mex. 2109, Fl. Mex. 604, C—folio!) is apparently a monstrous form, unlike any other collections from Mexico. The ultimate pinnae are at most 1 cm wide. I am unable to place the name.

2. **Sticherus brevipubis** (Christ) A. R. Smith, Amer. Fern J. 70:27. 1980.

—*Gleichenia brevipubis* Christ, Bull. Herb. Boissier (2)6:280. 1906. —LECTOTYPE (chosen by Lellinger, Proc. Biol. Soc. Wash. 89:713. 1977): Costa Rica, "Valle del Río Navarro," 1905, *Wercklé s.n.* (P, photo UC! US; isolectotype US).

ILLUSTRATION: **Fig. 76.**

Closely related to *S. bifidus*, differing by characters given in key; secondary axes often (but not always) pectinate on both sides of axis.

Roadbanks adjacent to Montane Rain Forest, Evergreen Cloud Forest; uncommon in s Sierra Madre, Central Plateau; 1900–2400 m. Southern Mex. (Chis. only?), Guat., Hond., Salv., C.R.; Jam. CHIAPAS COLLECTIONS: *22704A*; *31966*; *40232*; *41081*; *EM 15392* (MEXU) is probably also this species. I have not seen the collection.

Stolze (Fieldiana, Bot. 39:48–49. 1976) has characterized this species very well, and I believe that *S. brevipubis* is at least as distinct from *S. bifidus* as *S. underwoodianus* is from *S. palmatus*. The axillary and costal scales provide excellent diagnostic characters. In addition, Chiapas specimens of *S. brevipubis* have been collected at higher elevation than our specimens of *S. bifidus*.

3. **Sticherus palmatus** (Schaffner ex Underw.) Copel., Gen. Fil. 28. 1947.

—*Dicranopteris palmata* Schaffner ex. Underw., Bull. Torrey Bot. Club 34:259. 1907. —TYPE: Mexico, Veracruz, Orizaba, *Pringle 6129* (NY; isotypes B, BM! GH, IJ, K! US).

Mertensia palmata Schaffner ex Fourn., Mex. Pl. 1:137. 1872. —*Gleichenia palmata* (Schaffner ex Fourn.) C. Chr., Ind. Fil. 323. 1905. —*Mertensia palmata* Schaffner ex Fée, Mém. Fam. Foug. 9:32. 1857 (nom. nud.). —*Gleichenia palmata* Moore, Ind. Fil. 380. 1863 (nom. nud.). —LECTOTYPE (chosen by Proctor, Brit. Fern Gaz. 9:218. 1965): Mexico, Veracruz, Jalapa, *Schaffner 229* (presumably P; isotype K!).

ILLUSTRATION: Stolze, Fieldiana, Bot. 39:47, fig. 11, a–b. 1976.

Rhizome 4 mm or more diam., clothed with copious, lanceolate, spinescent-ciliate, castaneous scales; primary leaf-axis continuous, 60 cm or more long, scaly below, above glabrate, greenish, with 2–3 pairs of primary branches, these divergent at right angles; primary branches usually 2–4 times pseudodichotomous (or infrequently a secondary leaf axis developed), primary internodes 4.5–8 cm long, stipulate on upper side at lower node, otherwise naked; secondary internodes 3.5–4 cm long, diverging at an angle of 60 degrees, with 1 or 2 reduced segments at lower node, otherwise naked; tertiary internodes 4–6 cm long, diverging at an angle of 30–40 degrees, fully pectinate throughout like the pinnae; pinnae 20–25 cm or more long, 3–5.5 cm broad, tapering gradually, cut to the rachis; rachis sparingly clothed beneath with deciduous laxly long-ciliate mostly ferruginous scales, scales of the internodes smaller, darker, with pale borders, appressed; segments herbaceous, fragile, very close, linear, subacute, 1.5–2.8 cm long, 2.5–4 mm broad, bright green, margins entire and scarcely revolute; costae, veins, and leaf tissue lightly pubescent with whitish 3- or 4-parted (stellate) hairs; veins 20–28 pairs; sori 3–5-sporangiate, nearly medial; $n = 34$ (Jam.).

Slopes with Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands (Jitotol Ridge); 1350–2000 m. Southern Mex. (Hgo., Ver., Pue., Oax.?), Guat., Hond.; Jam., Cuba. CHIAPAS COLLECTIONS: *23221*; *32396*; *32547*.

Of the Chiapas collections, only *32547* is typical for the species. The other two collections vary in the direction of *S. underwoodianus*. Judging from Chiapas collections, these two species must be very closely related, since there are several collections somewhat intermediate between the two. The main character that Maxon (1909) and others have used to distinguish them (ultimate pinna width) may not be altogether reliable, since there seem to be specimens of otherwise typical *S. palmatus* with pinnae less than 3.5 cm broad. The two species have similar costal scales, although these are usually denser and more persistent in *S. underwoodianus*. Another difference may be the more prominently ciliate-spinescent rhizome scales of *S. palmatus*. In general, *S. palmatus* seems to grow at lower elevations than *S. underwoodianus*.

Morton (Contr. U.S. Natl. Herb. 38:234. 1973) overlooked the valid publication of *Mertensia palmata* Schaffner ex. Fourn. and consequently erred in his presentation of the nomenclature of this species; in this he was followed by Duek (Feddes Repert. 87:355. 1976) and Stolze (Fieldiana, Bot. 39:49. 1976).

4. **Sticherus underwoodianus** (Maxon) Nakai, Bull. Natl. Sci. Mus. 29:31. 1950.

—*Dicranopteris underwoodiana* Maxon, No. Amer. Fl. 16(1):59. 1909. —*Gleichenia underwoodiana* (Maxon) C. Chr., Ind. Fil. Suppl. I, 44. 1913. —TYPE: Mexico, Chiapas, *Ghiesbreght 271* (YU; isotypes BM! GH—photo BM!, K! PH! fragm. US!).

Illustration: Rovirosa, Pterid. Sur Mex. pl. 1. 1909 [as *Gleichenia pubescens*].

Rhizome wide-creeping, branched, 2–3 mm diam., with scales reddish brown, linear-lanceolate, tortuous, rigidly ciliate; fronds 50–60 cm high; stipe 2–3 mm diam., slightly scaly at base, reddish brown, glabrate or (above first pair of branches) clothed with subpersistent, narrow, pale-rusty, spreading, long-ciliate scales; primary lateral branches 2 pairs, ca. 14 cm apart, twice pseudodichotomous, primary internode 3–6.5 cm long, slender, nearly naked, bearing one or several segments upon upper side near base and casually 1 or 2 at base below; secondary internodes 3.5–10 cm long, fully pectinate on both sides, included bud often conspicuous, rounded-oblong, densely clothed with long-ciliate rusty scales; pinnae linear, slightly narrowed at base, especially upon inner side, 18–30 cm long, 2.5–3.2 cm broad, gradually attenuate, the rachises closely invested with short rusty chaff; segments 50–80 pairs, delicately herbaceous, dull dark green above, paler below, linear-oblong from a slightly broader base, scarcely joined; costae clothed with deeply cleft rusty scales, the divisions slender; veins 12–15 pairs, dark reddish, 1-forked near base, fibrillose with rusty, stellate, hairlike scales; sori mostly 3–5-sporangiate, medial or slightly supramedial on anterior branch.

Steep slopes and roadbanks in Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest, Pine-Oak Forest; uncommon in Central Plateau, Northern Highlands, Sierra Madre; (1700) 2200–2700 m. Southern Mex. (Chis. only?), Guat., Hond. Chiapas Collections: *R 854* (K, YU); *G 271* (BM, K, PH, US), type collection; *GM 32* (DS, US); *EM 5392* (US); *6902*; *22009*; *22402*; *25435*; *32035*; *34438*; *40509*; *40883*; *42765*.

I am unable adequately to distinguish *Sticherus jamaicensis* (Underw.) Nakai, type from Jamaica, from *S. underwoodianus*. *Sticherus jamaicensis* has priority.

96. STIGMATOPTERIS

Stigmatopteris C. Chr., Bot. Tidsskr. 29:292. 1909. —*Dryopteris* subg. *Stigmatopteris* (C. Chr.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:73. 1913. —Type: *Polypodium flavopunctatum* Kaulf. [=*Stigmatopteris rotundata* (Willd.) C. Chr.].

Peltochlaena Fée, Gen. Fil. 289. 1852. Regarded by Christensen (1913:74) and Copeland (1947:122) as a provisional name, but I do not think this is certain; if validly published, it has priority over *Stigmatopteris*.

Plants terrestrial; rhizome short, suberect, scaly at apex; stipe with numerous meristeles, scaly at base, otherwise glabrous; blade simply pinnate to deeply pinnate-pinnatifid (bipinnate in a few species), gemmiparous in a few species; pinnae gradually reduced to the pinnatifid apex; veins free (ours) or irregularly anastomosing, ending well before the margin in a clavate tip (as seen adaxially); leaf tissue dark green, pellucid-punctate by immersed yellowish glands, without hairs; sori round, exindusiate (ours) or indusiate in a few species, indusia peltate; sporangia long-stalked, stalks remaining when capsules abscise; spores brownish, oblong-reniform, bilateral, with a perispore; $x = 41$.

About 23 species in the Neotropics, with most species occurring from Costa Rica to Bolivia and in southern Brazil. The few indusiate species, whose affinities with the exindusiate species are not certain, occur from Colombia to the Guianas and Amazonian Brazil. Only four species are known from the Antilles, three in the Greater Antilles and one in the Lesser Antilles. The affinities of *Stigmatopteris* are uncertain, but perhaps with *Phanerophlebia*.

References: Christensen, C. 1909. On *Stigmatopteris,* a new genus of ferns with a review of its species. Bot. Tidsskr. 29:291–304; 1913. A monograph of the genus *Dryopteris*. Part. 1. The tropical American pinnatifid-bipinnatifid species. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:55–282.

Blade merely pinnate, the pinnae lobed less than one-fourth of the way from the margin to the costa; pinnae in distal two-thirds of blade long-decurrent; costal scales linear to lanceolate, few .... 1. *S. longicaudata*

Blade pinnate-pinnatifid, the pinnae lobed more than half the way from margin to costa; only the apical pinnae with a decurrent leaf base; costal scales ovate, numerous .... 2. *S. sordida*

1. **Stigmatopteris longicaudata** (Liebm.) C. Chr., Bot. Tidsskr. 29:300. 1909.

—*Polypodium longicaudatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:209. 1849. —*Dryopteris longicaudata* (Liebm.) Maxon, Contr. U.S. Natl. Herb. 13:18. 1909. —Type: Mexico, Veracruz, "Baranca de Huitamalco," *Liebmann* [Liebm. Pl. Mex. 2694, Fl. Mex. 737, 738, 739] (C!—folio herbarium; isotype K!). I choose no. 737 as lectotype.

Illustrations: **Fig. 77**; Christensen (1909:301, fig. 10); Rovirosa, Pterid. Sur Mex. pl. 40. 1909 (as *Polypodium flavopunctatum*).

Fronds mostly 1.0–1.4 m long with stipes ½–⅔ blade length, stramineous to tan with brown, ovate-lanceolate scales at base; blade pinnate with ca. 15–18 pairs of lateral pinnae; pinnae 15–18 cm long, 2–3 cm broad, serrately incised or lobed less than ¼ their width, lowermost stalked to 5 mm, all but lowermost 2–4 pairs adnate and long-decurrent onto rachis, those pinnae of upper ⅓ of blade connected by a wing; costae below with a few scattered, linear-lanceolate, tan scales, otherwise glabrous; veins 3–6 pairs per segment, not united (ours) or casually united; sori in a double row between costules, 2–5 pairs of sori per segment; indusia absent.

In Montane Rain Forest; uncommon in Northern Highlands, se Central Plateau; 500–1700 m. Southern Mex. (Oax., Ver.), Guat., C.R., Pan.; S.A. (Peru, Bol.). Chiapas Collections: *GM 3* (DS); *R 822* (K, PH); *G 431* (YU); *32672*; *35128*.

The Münch collection cited by Christensen (1909:300) is probably wrongly localized, no doubt collected at a lower elevation than San Cristóbal, probably in the Northern Highlands.

2. Stigmatopteris sordida (Maxon) C. Chr., Ind. Fil. Suppl. III. 175. 1934.

—*Dryopteris sordida* Maxon, Contr. U.S. Natl. Herb. 24:60. 1922. —TYPE: Guatemala, Alta Verapaz, Cubilquitz, *v. Türckheim II. 1432* (US; isotype US).
ILLUSTRATION: none found.

Fronds 1 m or more long, scaly at stipe base; blade pinnate-pinnatifid, with 15–20 pairs of pinnae; pinnae to ca. 20 cm long, 2.5–4.0 cm broad, lobed ⅔–¾ their width, with a strongly inequilateral base (acroscopic segments longer, basiscopic segments more oblique); lowermost pinnae short-stalked, middle ones sessile to subadnate, distal ones fully adnate and short-decurrent, only the uppermost few joined by a wing; costae below with numerous ovate-lanceolate, tan scales, otherwise glabrous; veins 6–11 pairs per segment, not united; sori 5–10 pairs per segment; indusia absent.

Habitat and elevational data lacking, probably in middle elevation rain forests; Northern Highlands, s Sierra Madre? Southern Mex. (Oax.), Guat., C.R., Pan. CHIAPAS COLLECTIONS: *P 6870* (B, MO, NY, UC, US); *G 288* (YU).

97. TECTARIA

Tectaria Cav., Anales Hist. Nat. 1:115. 1799. —TYPE: *Tectaria trifoliata* (L.) Cav. [≡*Polypodium trifoliatum* L.].
Aspidium Swartz, J. Bot. (Schrader) 1800(2):4, 29. "1801" [1802]. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 200. 1875): *Aspidium trifoliatum* (L.) Swartz.
For additional synonymy, see Copeland (1947).

Plants terrestrial or epipetric; rhizome usually stout, dictyostelic, short-creeping to erect, scaly; fronds monomorphic; stipe with numerous meristeles arranged in a ring in cross section; blade simple to usually pinnatifid to pinnate or more compound; veins anastomosing to form pentagonal or hexagonal areoles, these often with included veinlets; axes adaxially with short, *Ctenitis*-hairs (yellowish, septate, with individual cells very short) in the grooves; sori dorsal, commonly round (elongate in a few species), with a reniform to peltate indusium; spores bilateral, monolete, with a thick, winged perispore; $x = 40$.

Pantropical, with perhaps 200 species; Copeland (1947) estimated 43 species for the Neotropics; the actual number is probably somewhat smaller, perhaps 25–30, with the greatest number of species in Andean regions. Species of *Tectaria* are usually found in lower elevation rain forests (below 1500 m), often along streams; a few species seem to be confined to limestone outcrops.

A thorough comparative study is needed better to define the limits of *Tectaria* with regard to such genera as *Hypoderris*. Certain of the species traditionally placed in *Tectaria* should perhaps be transferred to that genus.

REFERENCE: MORTON, C. V. 1966. The Mexican species of *Tectaria*. Amer. Fern J. 56:120–137.

a. Indusia peltate, without sinuses or lobes, coriaceous, persistent, the margins inrolled at maturity; blade simple and lobed or 1-pinnate, with usually only 1–2 (3) pairs of lateral pinnae .... 1. *T. heracleifolia*
aa. Indusia reniform, attached at a sinus, basal lobes often overlapping, thus closing sinus and making indusia appear peltate; blade pinnate to bipinnate-pinnatifid, with (2) 3 or more pairs of lateral pinnae.
  b. Blade bipinnate-pinnatifid or subtripinnate at base; rhizome creeping; areoles mostly without included veinlets; margins of pinnae ciliate, especially at bases of lobes .... 3. *T. mexicana*
  bb. Blade simply pinnate, with (2) 3 pairs of pinnae or more; rhizome erect; areoles often with a free, included veinlet; margins of pinnae not ciliate.
    c. Lowermost pinnae with a single basal, basiscopic lobe; margins of pinnae sinuate to entire; costae, and leaf tissue below glabrous (Chis. material) .... 2. *T. incisa*
    cc. Lowermost pinnae with 2–3 basal, basiscopic lobes; margins of pinnae with broad, coarse lobes nearly to apex; costae and leaf tissue below usually with short, glandular hairs .... 4. *T. transiens*

1. Tectaria heracleifolia (Willd.) Underw., Bull. Torrey Bot. Club 33:200. 1906.

—*Aspidium heracleifolium* Willd., L. Sp. Pl., ed. 4, 5:217. 1810. —TYPE: based on Plumier's Tract. Fil. Amer. pl. 147, 1705, illustrating a plant from Hispaniola.
Polypodium cordifolium Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):31, pl. 4, fig. 2. 1842 (not *P. cordifolium* L., 1753). —TYPE: Mexico, Veracruz, "rivière de l'Antigua," *Galeotti 6313* (BR! isotype BR!).
ILLUSTRATIONS: Rovirosa, Pterid. Sur Mex. pl. 34. 1909 [as *Aspidium trifoliatum*]; Small, Ferns SE States 205. 1938; Lowe, Ferns 6:pl. 29. 1857 [as *Aspidium trifoliatum*]; Vareschi, Fl. Venez. 1(1):pl. 76. 1969.

Rhizome suberect to erect, 6–15 mm diam., apex with lanceolate scales, these 2–3 mm long, blackish and shining, slightly fimbriate; fronds mostly (12) 30–70 cm long, stipe often longer than blade, stramineous to reddish brown, shining, glabrous; blade simple to 1-pinnate, deltoid, (14) 20–35 (50) cm long, (2.5) 14–40 cm broad; rachis glabrous, not gemmiferous; pinnae 0–2 lateral pairs (juvenile fronds merely cordate or trilobate), pentagonal, basal pair of pinnae much the largest, 12–25 cm long, long-stalked (3–30 mm), with a prominent basal basiscopic lobe and often also with a shorter acroscopic lobe, lobes acute, 5–15 cm long, entire to sinuate; areoles pentagonal or hexagonal, often with a single, free, included veinlet; costae and costules below glabrous (ours) or with short glandular hairs; sori in 2 rows, one on either side of main lateral veins; indusia persistent, peltate, large, 2–3.5 mm diam., at maturity thick, angled from the strongly incurved margins; $n = 40$ (S.L.P., C.R.), 80 (Fla., Jam.).

Along streams and on rocks, in Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest; common in Eastern and Northern highlands (but not Jitotol

Ridge), Central Plateau, edge of Central Depression; 300–1300 m. Texas, E and S Mex. (N.L., Tam., S.L.P., Nay., Jal., Ver., Pue., Mlos., Mich., Cma., Gro., Oax., Tab.), Bel., Guat., Hond., Nic., C.R.; S.A. (Ven., Peru); Fla., Antill. Chiapas Collections: *EM 17899* (MEXU, US); *MC 1771* (US); *MC 1847* (US); *Se 5473* (US); *S 1588* (MEXU, US); *S 1691* (MEXU, US); *R 77* (US); *L 223, 289* (DS); *9995*; *13555*; *21142*; *21619*; *21875*; *22147*; *22245*; *22249*; *22310*; *22453*; *22497*; *23855*; *23900*; *24213*; *25534*; *26490*; *26548*; *27439*; *31485*; *32568*; *32851*; *33000*; *33185*; *33807*; *33882*; *34207*; *34483*; *34966*; *35207*; *35381*; *37232*; *38079*; *41996*.

Morton (1966) recognized a var. *trichodes*, differing from var. *heracleifolia* in the densely hirsute leaf tissue above, from Guatemala; this variety has not yet been found in Chiapas, but is to be expected. Variety *maxima*, described by Morton (1966) from Veracruz, differs in its bipinnate blade. Morton suggested that it might be a hybrid with *T. dilacerata* (an error for *T. mexicana*?). *Breedlove 23855* is the only Chiapas collection that is bipinnate and so by definition would be this variety. However, it differs in no other way from the typical form, and I think it is merely a more robust specimen of no taxonomic significance.

2. **Tectaria incisa** Cav., Descr. Pl. 249. 1802.

—Type: Puerto Rico, *Ventenat s.n.* (MA, seen by Christensen, Dansk Bot. Ark. 9(3):14. 1937.

Aspidium martinicense Spreng., Anleit. Kenntn. Gewächse 3:133. 1804. —*Aspidium macrophyllum* Rudolphi, Bemerkungen aus dem Gebiet der Naturgeschichte 2:103. 1805 (*nota*). —*Tectaria martinicensis* (Spreng.) Copel., Philipp. J. Sci., Bot. 2:410. 1907. —Type: Santo Domingo [Hispaniola], *Poiteau s.n.* [incorrectly said to be from Martinique by Sprengel].

For additional synonymy, see Morton (1966).

Illustration: Ettingshausen, Farnkr. pl. 128, 130. "1865" [1864].

Rhizome erect, 1.5–2 cm diam., apex with lanceolate scales 3–6 mm long, castaneous, strongly fimbriate; fronds mostly 70–170 cm long, with stipe about equaling blade, stramineous to brownish, glabrous; blade 1-pinnate, oblong to ovate-oblong, 40–75 cm long, 20–60 cm wide; rachis glabrous or glabrescent, sometimes (not ours) gemmiferous in axils of pinnae; pinnae (2) 3–10 pairs, oblique, distal pinnae adnate, basal pair short-stalked (to 5 mm), with an elongate, acute, basal, basiscopic lobe, otherwise subentire or repand; other pinnae mostly 20–25 cm long, 3.5–6 (7) cm broad; areoles pentagonal or hexagonal, often with included free veinlets; costae and costules below glabrous (ours); sori in 2 rows, one on either side of main lateral veins; indusia persistent, reniform or round, with a basal sinus, lobes overlapping and indusia thus appearing peltate, margins recurved at maturity; *n* = 40 (Jam., Trin., Peru), 80 (P.R., Jam.).

Slopes and stream banks in Tropical and Lower Montane rain forests, Seasonal Evergreen Forest; locally common in Sierra Madre, S Pacific Coastal Plain, Eastern and Northern highlands (but not Jitotol Ridge); 150–550 m. Southern Mex. (Oax., Ver.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., Braz., N Arg.); Antill., Trin. Chiapas Collections: *P 6762* (UC, US); *EM 17955* (MEXU, DS, US); *EM 18163* (DS, MEXU, US); *Mi 6752* (MEXU); *R 866* (PH); *G 408* (PH); *22522*; *26430*; *30669*; *30683*; *32840*; *33885*; *34077*; *34506*.

A gemmiferous form [forma *vivipara* (Jenm.) Morton], with buds or even small plantlets in the axils of pinnae, occurs nearly throughout the range of the species but has not yet been collected in Chiapas. I have seen collections from Oaxaca and Veracruz.

The plant named *T. incisa* ssp. *transiens* by Morton (1966) seems to me to be a distinct species (see *T. transiens* for discussion).

3. **Tectaria mexicana** (Fée) Morton, Amer. Fern J. 56:133. 1966.

—*Sagenia mexicana* Fée, Gen. Fil. 313. 1852. —Syntypes: Mexico. Oaxaca, *Galeotti 6542*; Etlapa, *Galeotti 6484* (presumably P).

Aspidium latifolium Presl, Rel. Haenk. 1:30. 1825 [not *T. latifolia* (Forst.) Copel., 1907]. —Type: Mexico, *Haenke s.n.* (presumably PR or PRC).

Illustration: Rovirosa, Pterid. Sur Mex. pl. 37. 1909 [as *Nephrodium cicutarium*].

Rhizome short-creeping to erect, 9–16 mm long or more, 8–20 mm diam., apex with lanceolate-subulate scales, these 7–9 mm long, dark brown, margins paler, ciliate; fronds mostly 40–100 cm long, with stipe shorter than or about equaling blade, stramineous to usually reddish brown, pilose; blade bipinnate-pinnatifid to subtripinnate at the base, deltoid, 20–50 cm long; rachis densely pubescent to glabrescent, not gemmiferous; pinnae 3–6 pairs, only the upper pinnae decurrent, basal pair deltoid, 12–38 cm long, 7–30 cm wide, long-stalked (to 4 cm); basal proximal pinnule of lowermost pinnae the largest, to 22 cm long; areoles mostly elongate-pentagonal, mostly without free included veinlets; costae and costules below pilose with short, glandular hairs or glabrescent; sori in 2 rows, one on either side of costule; indusia persistent, round, with a deep sinus and rounded, overlapping lobes, thus appearing peltate, remaining membranous and not thickened at maturity, ruffled at maturity but without strongly incurved margins, ciliate; *n* = 40 (Chis.).

In Tropical, Lower Montane, and Montane rain forests, Tropical Deciduous Forest, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest, rarely Evergreen Cloud Forest; relatively common in Sierra Madre, Pacific Coastal Plain, Northern and Eastern highlands; 200–1600 (2000) m. Western and S Mex. (Nay., Jal., Mich., Gro., Ver., Oax.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col.). Chiapas Collections: *R 1078* (PH); *21667*; *22471*; *22510*; *24047*; *25228*; *25607*; *30553*; *31340*; *31481*; *31568*; *32554*; *33086*; *33860*; *38103*; *40135*; *42649*.

The name *Tectaria dilacerata* (Kunze) Maxon has often been applied to this species, but Morton (1966) pointed out that this name, as lectotypified by Mettenius, is a synonym of the West Indian *T. cicutaria* (L.) Copel.

Tectaria mexicana is closely related to *T. rheosora* (Baker) C. Chr. from southern Central America. The latter apparently differs by the presence of long, septate hairs on the axes below and the slightly elongate sori with deciduous indusia.

4. **Tectaria transiens** (Morton) A. R. Smith, Amer. Fern J. 70:27. 1980.

—*Tectaria incisa* subsp. *transiens* Morton, Amer. Fern J. 56:133. 1966. —Type: Mexico, Veracruz, Cordoba, *Finck 57* (US).

Illustration: **Fig. 78.**

Rhizome probably erect, not seen; fronds to ca. 130 cm long, stipe ± equaling blade length, reddish brown, glabrous; blade 1-pinnate, to 60 cm long; rachis glabrous, not gemmiferous; pinnae ca. 4–6 lateral pairs, basal pair largest, to 30 cm long, short-stalked (to ca. 5 mm), with 2–3 prominent, basal, basiscopic lobes but lacking acroscopic lobes, rest of pinna margin serrately lobed on both sides; basal basiscopic lobes to 12 cm long, entire to sinuate; areoles pentagonal to hexagonal, often with a free included veinlet; costae and veins below with moderate to dense, short (0.1–0.2 mm), glandular hairs, similar hairs also on leaf tissue below; sori in 2 rows on both sides of main lateral veins; indusia persistent, round to reniform, with a basal sinus, lobes overlapping, indusia thus appearing peltate, margin glandular-hairy.

In Montane Rain Forest; uncommon in Northern Highlands (Jitotol Ridge), SE Central Plateau, S Sierra Madre; 1250–1700 m. Southern Mex. (Ver.), Guat., C.R.; S.A. (Ecu., Peru). CHIAPAS COLLECTIONS: *Mi 6972* (MEXU); *26054*; *32593*; *38941*.

In the sum of its characters, *T. transiens* is intermediate between *T. heracleifolia* and *T. incisa,* and I suspect that it has arisen through hybridization. However, in Chiapas it has been collected in areas where neither of the suspected parents have been found. It differs from *T. heracleifolia* in its nonpeltate indusia, greater number of lateral pinnae, shorter-stalked lower pinnae, and lack of strongly developed acroscopic lobes on lower pinnae. From *T. incisa,* it differs in the pinnae being serrately incised most of their length and in the presence of 2–3 large basal basiscopic lobes. From both species (Chiapas material only), *T. transiens* differs in the presence of short, glandular hairs on the costae, veins, and leaf tissue below and also on the indusia. Spores of several collections appear well formed. Throughout its range, *T. transiens* seems to grow at higher elevations than either *T. heracleifolia* or *T. incisa*.

Additional collections seen are *Sanchez 63* (UC) from Veracruz, *Tuerckheim 839* (UC) from Guatemala; and *Brade 47* (UC), *Stork 2107* (UC), *Stork 1546* (UC) from Costa Rica. Similar collections have been seen from Ecuador and Peru.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Tectaria lobata (Presl) Morton —Fla., Bah. Is., Cuba, Hisp., Yuc. Distinguished from other Chiapas species by the combination of reniform indusia attached at their sinus, blades usually merely lobed, small, rhizomes creeping, slender (2–3 mm diam.), leaf tissue septate-pilosulous on costae and veins below.

T. nicotianifolia (Baker) C. Chr. —Guat., Hond., C.R., Pan. Differs from other Chiapas species by the persistently scaly stipes and rachises, the simple or pinnatisect blades (rachis winged throughout), the numerous small exindusiate sori, and the long-creeping rhizome. This and the following species seem more closely allied to *Hypoderris brownii,* from Trinidad, and should probably be transferred to that genus.

Tectaria plantaginea (Jacq.) Maxon var. *plantaginea* —Antill., Bel., Hond. to Ven., Peru, Braz. Differing from other Chiapas species by the blades simple and unlobed and indusia absent.

98. THELYPTERIS

Thelypteris Schmidel, Icon. Pl. (ed. Keller) 45, pls. 11, 13. Oct. 1763. —TYPE: *Acrostichum thelypteris* L. [=*Thelypteris palustris* Schott]. Some authors adopt *Thelypteris thelypterioides* (Michx.) Holub as the name for this taxon (but see Tryon & Tryon, 1973, Amer. Fern J. 63:65–76, for argument against this).

Habitat terrestrial to rarely epipetric; rhizome long-creeping to short-creeping to erect, dictyostelic, scaly, scales entire and usually ciliate on margin and/or surface; stipe in cross section with two crescent-shaped vascular bundles at base, these fusing distally; stipe, rachis, and costae adaxially sulcate, sulci not running continuously into axis of the next order; fronds simple to pinnate to usually pinnate-pinnatifid, to decompound (Old World groups); lamina, stipe, and/or rachis nearly always at least sparingly hairy, hairs acicular (unicellular or multicellular), hamate, or stellate; sori dorsal on veins, occasionally submarginal, with or without reniform indusia; spores bilateral, monolete (tetrahedral and trilete in a few Old World species), with a usually prominent perispore; gametophytes cordate, usually glandular or hairy; x = 36, 35, 34, 32, 31, 30, 29, 27.

In its broadest sense as taken here, *Thelypteris* is a genus of about 1000 species, distributed pantropically, with a few species in temperate areas. There are perhaps 300 species in the Neotropics. *Thelypteris* s.l. has been subdivided by many pteridologists into natural groups variously treated as genera, subgenera, or sections. I believe that most of these can be well circumscribed using several characters and thus could stand as genera. However, largely as a matter of convenience, I prefer to maintain an inclusive genus with several subgenera. Those subgenera occurring in Chiapas can be distinguished by the following key:

a. At least some hairs on rachis, costae, stipe base, and/or stipe base scales forked or stellate .... subg. *Goniopteris*

aa. Hairs all acicular, unicellular or multicellular.

  b. Lamina essentially pinnate, pinnae entire or with an undulate or serrate margin, occasionally very shallowly lobed; areoles formed by the united or meniscioid veins 3–15-seriate.

    c. Sori mostly discrete, or only basal pair confluent .... subg. *Goniopteris*

    cc. Sori mostly confluent where veins anastomose .... subg. *Meniscium*

  bb. Lamina ± deeply pinnate-pinnatifid one-half or more to costa (2-pinnate-pinnatifid in one species); veins free, connivent at sinus, or with 1–2 pair(s) anastomosing.

    d. Lamina 2-pinnate-pinnatifid .... subg. *Macrothelypteris*

    dd. Lamina pinnate-pinnatifid.

      e. Lamina reduced towards base, with one or usually several pairs of reduced pinnae, lowermost pinnae often auriculiform or glanduliform; veins free, meeting margin above sinus (at the sinus in *T. linkiana*) .... subg. *Amauropelta*

ee. Lamina without reduced pinnae, the lowest the longest or nearly longest; veins connivent at sinus or meeting margin at the sinus, or if greatly reduced pinnae are present the veins anastomosing with an excurrent vein to the sinus.

f. Sori elongate along the veins, exindusiate; sporangial walls often setose .... subg. *Stegnogramma*

ff. Sori round, indusium present and persistent or absent; sporangial walls without setae (ours).

g. Indusia present and persistent, large; aerophores at base of pinnae inconspicuous or absent .... subg. *Cyclosorus*

gg. Indusia absent; aerophores 2–10 mm long at base of pinnae .... subg. *Steiropteris*

REFERENCES: CHRISTENSEN, C. 1907. Revision of the American species of *Dryopteris* of the group of *D. opposita*. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)4:247–336; 1913. A monograph of the genus *Dryopteris*. Part I. The tropical American pinnatifid-bipinnatifid species. Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:55–282; MAXON, W. R., AND C. V. MORTON. 1938. The American species of *Dryopteris*, subgenus *Meniscium*. Bull. Torrey Bot. Club 65:347–376; SMITH, A. R. 1971. Systematics of the Neotropical species of *Thelypteris* section *Cyclosorus*. Univ. Calif. Publ. Bot. 59:1–143; 1973. The Mexican species of *Thelypteris* subgenera *Amauropelta* and *Goniopteris*. Amer. Fern J. 63:116–127.

Thelypteris subg. **Amauropelta** (Kunze) A. R. Smith, Amer. Fern J. 63:121. 1973.

—*Amauropelta* Kunze, Farrnkr. 1:86, 109. 1843. —TYPE: *Amauropelta breutelii* Kunze [=*Thelypteris limbata* (Swartz) Proctor].

Rhizome suberect to erect, occasionally decumbent; lamina pinnate-pinnatifid (rarely pinnate or decompound), lowermost pinnae reduced, sometimes nearly to rhizome; aerophores present at bases of pinnae, or absent; veins usually simple, occasionally furcate, lowermost meeting margin of segments above sinus; sori round to occasionally somewhat elongate, medial to submarginal on veins, furnished with large to small indusia, or indusia absent; sporoderm evenly granular (light microscope), finely reticulate (scanning electron microscope); $x = 29$.

About 200 species, mostly at middle to higher elevations on margins of rain forests, along trails, wet roadside embankments, and along streams; tropical and subtropical America (Mexico, Florida, Antilles, Central America, and South America to northern Argentina and Chile), with one species in Hawaii and a few in Africa, Madagascar, and the Mascarene Islands (Smith, Amer. Fern J. 64:83–95. 1974; Holttum, J. S. African Bot. 40:123–268. 1974).

a. Indusia absent, or minute and completely obscured by sessile glands.

b. Sori oblong or elongate along veins.

c. Lowermost veins meeting margin at or near the sinus; leaf tissue below glabrous or very sparsely hairy; pinnae incised to ca. 2 mm from costae .... 7. *T. linkiana*

cc. Lowermost veins meeting margin above the sinus; leaf tissue below with hamate hairs; pinnae incised to within 1 mm of costae .... 1. *T. atrovirens*

bb. Sori round or nearly so.

d. Hairs fasciculate or subfasciculate on costae and rachis below, appearing stellate; red or orange hemispherical glands present on leaf tissue below; aerophores at base of costae to 4 mm long.

e. Hairs fasciculate; aerophores present at base of costules; pinnae greater than 2 cm broad .... 19. *T. thomsonii*

ee. Hairs subfasciculate; aerophores absent at base of costules; pinnae less than 2 cm broad .... 9. *T. nubigena*

dd. Hairs not fasciculate and not appearing stellate; glands absent; costal aerophores absent or less than 1 mm long.

f. Sporangia setulose; costae and rachis below minutely puberulous, the hairs less than 0.1 mm long .... 5. *T. concinna*

ff. Sporangia glabrous; costae and rachis below not minutely puberulous.

g. Costae below with at least a few scales, especially near base, the scales ± clathrate.

h. Hairs on costae below more or less antrorse, mostly less than 0.6 mm long; receptacular tissue glabrous or with a few short hairs; segments somewhat oblique, rounded or acute at tip .... 15. *T. rudis*

hh. Hairs on costae below mostly erect, to 1.5 mm long; receptacular tissue with stiff hairs like those of costae; segments ± perpendicular to costae, rounded at tip .... 12. *T. pilosohispida*

gg. Costae below without scales.

i. Rachis rather densely short-hairy; stiff hairs on costules and veins above ..... 11. *T. oligocarpa*

ii. Rachis glabrous; costules and veins above glabrous .... 6. *T. deflexa*

aa. Indusia present, usually not obscured by glands.

j. Hairs fasciculate or subfasciculate on costae and rachis below; red or orange hemispherical glands on leaf tissue below; aerophores present .... see couplet (e)

jj. Hairs hamate or acicular, not fasciculate; hemispherical glands present or absent; aerophores present or absent.
k. Hamate hairs present on leaf tissue below and/or indusia; glands absent on leaf tissue.
l. Reduced pinnae usually 2–4 pairs; rachis often darkened, densely hairy, the hairs 0.1–0.2 mm long with a few longer ones intermixed; indusia tan .... 11. *T. oligocarpa*
ll. Reduced pinnae more than 5 pairs, nearly to base of frond; rachis stramineous, not densely hairy.
m. Indusia dark-castaneous to blackish .... 8. *T. melanochlaena*
mm. Indusia stramineous to tan .... 16. *T. scalaris*
kk. Hamate hairs absent on leaf tissue and indusia; glands present or absent on leaf tissue.
n. Stipe and rachis hairs stiff, numerous, mostly 1–1.5 mm long.
o. Sori submarginal, often partially hidden by the revolute leaf margin; costal and rachis hairs septate; veins immersed below, often darkened; basal basiscopic segment of well-developed pinnae longer than others, parallel to rachis .... 3. *T. cheilanthoides*
oo. Sori medial to supramedial, not hidden by the margin; hairs mostly unicellular (not septate); veins not immersed below, usually slightly raised, stramineous; basal segments of pinnae not enlarged or elongate .... 13. *T. pilosula*
nn. Stipe and rachis glabrous or hairs mostly less than 0.3 mm long, or, if longer, flexuous.
p. Fronds small, mostly less than 40 cm long, with stipe 1–1.5 mm diam.; reduced basal pinnae 1–4 pairs; rachis glabrous or minutely puberulous.
q. Rachis and stipe usually darkened; rachis puberulous with hairs less than 0.1 mm long; indusia reddish brown .... 4. *T. cinerea*
qq. Rachis and stipe stramineous, ± glabrous; indusia tan .... 18. *T. tablana*
pp. Fronds usually large, longer than 40 cm, stipe more than 2 mm diam.; reduced basal pinnae 5 or more pairs.
r. Rachis, costae, veins, and leaf tissue below without hairs or glands (occasionally with obscure glands).
s. Segments oblong, not falcate, rounded at tip; indusia rather large, persistent; pinnae incised to ca. 1 mm from costae .... 10. *T. oaxacana*
ss. Segments linear to lanceolate, acutish at tip, subfalcate; indusia relatively small, somewhat obscured in mature sori; pinnae incised to within 0.5 mm of costae .. 17. *T. struthiopteroides*
rr. Rachis, costae, veins, and leaf tissue below sparsely to densely hairy; glands usually present on leaf tissue below.
t. Sori submarginal, often partially hidden by the revolute leaf margin; usually a few long-septate hairs on costae and rachis below; veins immersed below, often darkened; glands absent from leaf tissue below .... 3. *T. cheilanthoides*
tt. Sori medial to submarginal, usually not hidden by segment margin; septate hairs usually absent; veins slightly raised below, not darkened; sessile, hemispherical glands present or absent on leaf tissue below.
u. Pinna segments oblique, usually falcate; pinnae gradually reduced nearly to base of frond; pinna segments mostly 2–3 times as long as broad .... 14. *T. resinifera*
uu. Pinna segments ± perpendicular to costae, occasionally oblique; pinnae usually abruptly reduced below, with widely spaced smaller pinnae; segments mostly 4–6 times longer than wide .... 2. *T. balbisii*

1. **Thelypteris atrovirens** (C. Chr.) Reed, Phytologia 17:261. 1968.

—*Dryopteris atrovirens* C. Chr. *in* Christ, Bull. Herb. Boissier (2)7:263. 1907. —TYPE: Guatemala, Alta Verapaz, between Sepacuité and Secanquim, *Maxon & Hay 3281* (P, not found; isotypes NY! US!).

ILLUSTRATION: Christensen (1907:315, pinna).

Rhizome erect; fronds fasciculate, to 80 cm long, with 7–10 pairs of gradually reduced basal pinnae; stipe 5–15 cm long, scaly at base; pinnae 20–30 pairs, horizontal, alternate, the medial the largest, 6–10 cm long, 1.3–2.0 cm wide, 2–3 cm distant, incised 0.8 their width, the lowermost reduced to less than 1 cm long (often to 1 mm), 5–6 cm distant; segments spreading to slightly oblique (separated by a broad, round or acute sinus), 3–4 mm broad, oblong, apex rounded or obtuse, basal pair somewhat shortened (especially the anterior one); veins 7–9 pairs per segment; costae, veins, and leaf tissue below minutely puberulous with erect hairs 0.1 mm long, also with scattered hamate hairs on leaf tissue (0.2 mm long); leaf tissue above with numerous appressed hairs 0.1 mm long; sori oblong, supramedial, exindusiate; *n* = 29 (Chis.).

In Montane Rain Forest, Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge) and SE corner of Central Plateau; 1300–1700 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; Col. CHIAPAS COLLECTIONS: *GM 50*? (DS); *32185*; *32664*. The Münch collection from "Palenque" may be mislabeled.

2. **Thelypteris balbisii** (Spreng.) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10:250. 1941.

—*Polypodium balbisii* Spreng., Nova Acta Acad. Caes. Leop. Carol. German. Nat. Cur. 10:228. 1821. —*Aspidium sprengelii* Kaulf., Flora 6:365. 1823 (nom. superfl., see Morton, Amer. Fern J. 53:62. 1963). —*Dryopteris sprengelii* (Kaulf.) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —*Dryopteris balbisii* (Spreng.) Urban, Symb. Ant. 4:14. 1903. —*Thelypteris sprengelii* (Kaulf.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:65. 1953. —NEOTYPE (chosen by

Proctor, Fl. Less. Antill. 2:281, 1977): Dominica, *Hodge & Hodge 1203* (GH).

ILLUSTRATION: Christensen (1907:319).

Rhizome erect; stipe stramineous to tan, mucilaginous when young, mostly 3–6 mm diam.; fronds often 1 m or more long, to 40 cm broad, with up to 10 pairs of gradually to subabruptly reduced pinnae at the base; rachis glabrous or with deciduous septate hairs to 1.5 mm long; largest pinnae (8) 10–16 (22) cm long, 1.5–3.0 cm broad, deeply incised to within 1 mm of costae, usually opposite, horizontal; most pinnae with basal segments somewhat elongate; pinnae below with a peglike aerophore at the base; segments perpendicular or nearly so to costae, linear, 2–3 mm wide, rather closely placed; veins up to 18 pairs per segment; costae and costules sparsely hairy to often glabrous below, hairs (if present) mostly simple, occasionally septate; leaf tissue below often with numerous orangish to reddish, sessile, hemispherical glands; sori medial to submarginal, with a persistent tan, often glandulose indusium.

Along streams and in disturbed areas such as ditches, along paths; Tropical, Lower Montane, and Montane rain forests, Seasonal Evergreen Forest; scattered localities in Northern and Eastern highlands, s Pacific Coastal Plain; 300–1300 m. Southern Mex. (Ver., Tab., Oax.), Bel. and Guat. to Pan.; N S.A. (Ven., Col., Ecu., Gal.); Antill., Trin. CHIAPAS COLLECTIONS: *EM 17653* (F, MEXU); *19929*; *22439*; *34271*; *36658* (atypical).

3. Thelypteris cheilanthoides var. cheilanthoides

—*Thelypteris cheilanthoides* (Kunze) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:58. 1953. —*Aspidium cheilanthoides* Kunze, Linnaea 22:578. 1849. —*Dryopteris cheilanthoides* (Kunze) C. Chr., Ind. Fil. 257. 1905. —TYPE: Brazil, *Regnell s.n.* (S).

Phegopteris amplificata Fée, Mém. Fam. Foug. 8:89. 1857. —*Dryopteris amplificata* (Fée) C. Chr., Ind. Fil. 251. 1905. —TYPE: Mexico, Cordoba, *Schaffner 219* (not found at P; possible authentic specimen, *Schaffner s.n.*, P!).

ILLUSTRATION: Christensen (1907:325).

Rhizome erect, caudex 2–4 (5) cm thick; stipe base to 1 cm thick; fronds to 2 m long, usually mucilaginous when coiled, with 2–5 pairs of abruptly reduced basal pinnae, the lowermost glanduliform; rachis with stiff, whitish, multicellular hairs to 2.5 mm long, or glabrescent; pinnae 10–25 (30) cm long, 1.5–3 (4) cm broad, incised to within 1 (3) mm of costae, with prominent aerophore at the base; segments usually falcate or subfalcate, with a revolute margin, ca. 3 mm broad, basal segments often elongate, basiscopic one longest, often dentate and parallel to rachis; veins 12–18 (23) pairs per segment, usually immersed and blackened below; costae below usually with a few stiff multicellular hairs to 2 mm long, sometimes glabrous; leaf tissue subsucculent when living, chartaceous to subcoriaceous when dried, glabrous on both sides, or with sessile yellowish to orange glands on leaf tissue below; sori submarginal (often partially hidden by revolute margin) with a relatively large, persistent indusium that is often glandular on the margin; $n = 29, 58$ (Oax.).

Exposed disturbed areas such as road banks, trail sides, open stream banks, wet ditches, edges of marshes; Montane Rain Forest, Pine-Oak-Liquidambar Forest, Pine-Oak-Arbutus Forest, Evergreen Cloud Forest; relatively common in Central Plateau, Northern Highlands (Jitotol Ridge), s Sierra Madre; 1350–2700 m. Southern and w Mex. (Jal., Mich., Gro., Méx., Pue., Ver., Oax.), Guat., Nic., C.R.; S.A. (Col. and Ven. to Bol., s Braz.); Jam., Hisp. CHIAPAS COLLECTIONS: *GM 42* (US); *G 200* (NY); *8127*; *19894*; *19960*; *23001*; *23102*; *31980*; *32372*; *32449*; *32476*; *32713*; *34676*; *41342*.

Several specimens (e.g., *8127*, *23001*, *31980*, *32449*) completely lack the long, stiff, septate hairs usually characteristic of this species. However, lack of pubescence, by itself, is probably not an important character for distinguishing infraspecific taxa in *T. cheilanthoides*. I tentatively maintain *T. cheilanthoides* var. *mucosa* A. R. Smith, type from Oaxaca, because of its extraordinary size, lack of revolute segment margins, and less falcate segments. A paratype of var. *mucosa* from Chiapas more closely resembles the typical variety in size and blade cutting.

4. Thelypteris cinerea (Sod.) A. R. Smith, Phytologia 34:233. 1976.

—*Nephrodium cinereum* Sod., Anales Univ. Centr. Ecuador 22:103. 1908. —TYPE: Ecuador, Corazon, 8/903, *Sodiro s.n.* (not found at K or P, but authentic and topotypic specimen at P!—collected 12/907).

Thelypteris sanctiformis (C. Chr.) Reed, Phytologia 17:312. 1968. —*Dryopteris sanctiformis* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:130, fig. 12d. 1913. —TYPE: Panama, Vol. Chiriquí, *Maxon 5294* (US! isotype P!).

ILLUSTRATION: Smith (1973:119).

Rhizome erect; stipes fasciculate, 6–12 cm long, ca. 1–2 mm diam., brownish, shining, glabrous; rachis minutely puberulous by hairs less than 0.1 mm long; lamina narrowly lanceolate, deeply pinnate-pinnatifid, to 25 cm long, 3–7 (10) cm broad, lowermost 1–3 pairs reduced and auriculiform; pinnae ca. 15 (30) pairs, inequilateral with basiscopic side narrower, 2–4 (6) cm long, to 1.3 (2.0) cm broad, falcate; segments oblique, 2–3 mm broad, obtuse to acute at apex; veins 3–5 (8) pairs per segment; costae above setose, below glabrous or minutely puberulous; leaf tissue on both sides glabrous or with sessile yellowish to reddish glands below; sori medial to supramedial, with large persistent indusia to 1 mm diam., these glossy, reddish brown, often sessile-glandular; $n = 29$ (Oax., Chis.).

Along paths and stream banks, in Montane Rain Forest, rare in Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), s Sierra Madre; 1700–2200 m. Southern Mex. (Oax.), Guat., C.R., Pan.; S.A. (Ven., Col., Ecu.). CHIAPAS COLLECTIONS: *EM 5118* (DS, F, MEXU, US); *23127*; *23162*; *31678*; *32389*; *32682*; *42566*.

5. Thelypteris concinna (Willd.) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10:251. 1941.

—*Polypodium concinnum* Willd., L. Sp. Pl., ed. 4, 5:201. 1810. —*Dryopteris concinna* (Willd.) O. Ktze., Rev. Gen. Pl. 2:812. 1891. —TYPE: Venezuela, Caracas, *Bredemeyer s.n.* (B—Herb. Willd. 19698).

Phegopteris elongata Fourn., Mex. Pl. 1:89. 1872. —*Thelypteris concinna* var. *elongata* (Fourn.) Reed, Phytologia 17:268. 1968. —SYNTYPES: Mexico, all apparently Veracruz, "San Cristobal pr. Orizaba," *Botteri 1442* in Herb. Van Heurck (presumably P, not found); Tlapacoyo, *Hahn s.n.* (P!); "in montibus orientalis," *Linden s.n.* (presumably P, not found).

ILLUSTRATION: Christensen (1907:272).

Rhizome suberect to erect; stipe to ca. 15 (20) cm long, 2–4 mm diam., brownish; aerophores absent along rachis; lamina with up to 12 pairs of gradually reduced basal pinnae, to ca. 80 cm long; pinnae up to ca. 30 pairs, 8–14 cm long, 1–2 cm broad, incised to ca. 1 mm from costae; segments slightly oblique, obtuse to subacute at apex, ca. 2 mm broad; veins mostly 6–8 (10) pairs per segment; costae and rachis below minutely but densely and evenly puberulous, hairs less than 0.1 mm long, not hamate; leaf tissue chartaceous, below glabrous, eglandulose, above with appressed hairs 0.1 mm long, glabrescent; sori supramedial, exindusiate; sporangia minutely setose; *n* = 29 (Jam., Oax., Ver., Chis.).

Along streams and wet banks, in Montane and Lower Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; common in Northern and Central highlands, Sierra Madre; 800–2000 m. Eastern and s Mex. (N.L., S.L.P., Hgo., Pue., Ver., Oax.), Guat. to Pan.; S.A. (Ven. to NW Arg.); Antill. CHIAPAS COLLECTIONS: *P 6711* (GH, NY, UC, US); *14897*; *21688*; *22153*; *22246*; *22288*; *23282*; *23977*; *25354*; *28155*; *31985*; *32159*; *32468*; *32472*; *32755*; *33794*; *34630*; *34631*; *35195*; *40139*; *42098*; *42625*.

6. **Thelypteris deflexa** (Presl) Tryon, Rhodora 69:5. 1967.

—*Nephrodium deflexum* Presl, Rel. Haenk. 1:36, pl. 5, fig. 2. 1825. —*Dryopteris lindigii* C. Chr., Ind. Fil. 275. 1905. —*Thelypteris lindigii* (C. Chr.) Alston, J. Wash. Acad. Sci. 48:233. 1958. —TYPE: Peru, *Haenke s.n.* (PR?).

ILLUSTRATION: only the original.

Rhizome erect or suberect, caudex ca. 1–1.5 cm thick; fronds mostly 30–60 (120) cm long, with 2–4 (6) pairs of reduced basal pinnae; stipe stramineous with a blackened base, sparsely scaly at base (scales tan, ovate, ca. 3 mm long, glabrous), otherwise glabrous, 5–12 cm long, 1–2 mm broad; rachis glabrous below; pinnae horizontal or somewhat deflexed, opposite or subopposite, mostly 3–6 (9) cm long, 0.7–1.2 (1.8) cm broad (broadest at base), incised to within 1 (1.5) mm of costae; segments slightly oblique, rounded at apex, ca. 2–4 mm broad; veins 4–6 (8) pairs per segment; costae, veins, and leaf tissue below glabrous or sparsely hairy on costae, glabrous above except along costal groove; leaf tissue thin, herbaceous; sori medial, exindusiate; *n* = 58 (Oax.).

In Montane Rain Forest, Evergreen Cloud Forest; uncommon (two localities) in Northern Highlands (Jitotol Ridge) and Central Plateau; 1700–2700 m. Southern Mex. (Gro., Oax.), Guat., Hond., Nic., C.R.; S.A. (Ven., Col., Ecu., Peru). CHIAPAS COLLECTIONS: *21999*; *23153*; *32327*.

A possibly undescribed species, represented by *Breedlove 31739*, from El Porvenir, agrees with *T. deflexa* in blade shape and dissection, but has resinous reddish glands on the leaf tissue and receptacles below, scattered fibrillose scales on costae, and small aerophores at pinna bases.

7. **Thelypteris linkiana** (Presl) Tryon, Rhodora 69:6. 1967.

—*Gymnogramma polypodioides* Link, Hort. Bot. Berol. 2:50. 1833 (not Spreng., 1827). —*Grammatis linkiana* Presl, Tent. Pterid. 209. 1836. —*Dryopteris linkiana* (Presl) Maxon, J. Wash. Acad. Sci. 14:199. 1924. —TYPE: described from cultivated specimens (B).

Gymnogramma diplazioides Desv., Mém. Soc. Linn. Paris 6:214. 1827, as *G. diplazoides*. —*Dryopteris diplazioides* (Desv.) Urban, Symb. Antill. 4:21. 1903. —*Thelypteris diplazioides* (Desv.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:59. 1953, not *T. diplazioides* (Moritz ex Mett.) Ching, 1936. —TYPE: Hispaniola, collector not stated (P!).

ILLUSTRATION: Fée, Mém. Fam. Foug. 11:pl. 14, fig. 3. 1866 (as *Phegopteris duchassaigniana* Fée).

Rhizome erect; fronds 60–140 cm long, 2–6 lowermost pinnae reduced, lowermost 1–2 cm or more long, often short-stalked (ca. 1 mm); stipe 15–25 (45) cm long; proliferous buds nearly always present in axils of upper pinnae; pinnae 8–16 cm long, 1.5–2.5 (3.0) cm broad (broadest at base), incised 0.5–0.7 their width, with a small aerophore at base of larger pinnae; segments oblong, 4–6 mm broad, rounded to truncate at apex, spreading or slightly oblique; veins 4–8 (12) pairs, lowermost meeting margin at or slightly above sinus; costae and veins below with scattered hamate hairs ca. 0.2 mm long; leaf tissue on both sides glabrous or glabrescent, or with appressed hairs 0.1 mm long above; sori oblong to linear (to ca. 2 mm), exindusiate; *n* = 29 (Oax., Ver.), 58 (Chis.).

Forest edges, along streams, wet banks, in Montane Rain Forest, Pine-Oak Forest, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; scattered to locally common in Northern and Eastern highlands, SE Central Plateau, Sierra Madre; 800–1700 (2000) m. Southern Mex. (Pue.?, Ver., Oax.), Guat., Nic., C.R.; S.A. (Col. to Bol.); Antill. CHIAPAS COLLECTIONS: *23128*; *25104*; *25105*; *32219*; *32366*; *32634*; *33108*; *35127*; *36657*; *42089*; *42102*; *42646*; *42654*.

8. **Thelypteris melanochlaena** (C. Chr.) Reed, Phytologia 17:292. 1968.

—*Dryopteris melanchlaena* C. Chr., Smithsonian Misc. Collect. 52:384. 1909. —TYPE: Guatemala, Alta Verapaz, Cobán, *Donnell Smith 168*, pt. (US 828982).

ILLUSTRATION: none.

Rhizome suberect; stipe 5–10 cm long, 2.5–3.5 mm diam., stramineous, deciduously pubescent; lamina to 60 cm long, 8–22 cm broad, base with 7–14 pairs of gradually reduced pinnae; pinnae 4–12 cm long, 1.2–2.2 cm broad, up to 30 pairs, deeply pinnatifid to within 1 mm of costae; segments patent or slightly oblique, ca. 2.5–3.5 mm broad, rounded or subacute at apex; veins 7–10 pairs; costae on both sides with patent (below) or adpressed (above) hairs 0.2–0.3 mm long, without scales; leaf tissue below with numerous patent hamate hairs ca. 0.2 mm long, above appressed-puberulent with hairs ca. 0.1 mm long; sori supramedial to submarginal, with a dark brown to blackish shining indusium, indusia ciliate-margined; sporangia glabrous; *n* = 58 (Chis.).

In Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, rarely Evergreen Cloud Forest; scattered to locally common in Northern Highlands, SE Central Plateau, N Sierra Madre; 800–1700 (2300) m. Southern Mex. (Ver., Oax.), Guat., Hond., Nic., C.R. CHIAPAS COLLECTIONS: *21842*; *22368*; *23302*; *28113*; *31310*; *31512*; *32122*; *32482*; *33654*; *34654*.

9. **Thelypteris nubigena** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:229, fig. 7, C. 1975.

—TYPE: Mexico, Chiapas, Munic. San Cristóbal Las Casas, Zontehuitz, *Breedlove 22057* (*with Smith*) (DS!).

ILLUSTRATION: only the original.

Rhizome suberect; stipes to 15 cm long, 3 mm broad, darkened and sparsely scaly at base, scales ovate, tan, sparsely hairy on margin, less than 2 mm long; fronds to ca. 65 cm long, 4–5 lowermost pairs of pinnae gradually reduced, the lowest to ca. 1 mm; pinnae ca. 25 pairs, the largest 7–11 cm long, 1.8–2.3 cm wide, widest at base, lobed ca. 0.9 towards costae; segments oblique, subfalcate, to 10 mm long, 2 mm broad, rounded to subacute at apex; veins up to 10 pairs per segment; aerophores to 1 mm long at base of lower pinnae; rachis, costae, and costules on both sides epaleate, with scattered straight hairs ca. 0.2 mm long, the hairs often in pairs or threes (subfasciculate); glands on lower surfaces numerous, orangish to reddish, sessile, hemispherical; sori medial; indusia minute, obscured by orangish glands; *n* = 29 (Chis.).

In Evergreen Cloud Forest; rare in Central Plateau; 2800 m; known only from the type and from single collections from Oax. and Guat.

This species is probably related to *T. thomsonii,* but the hairs of *T. nubigena* are less obviously fasciculate, and the fronds are much smaller, the segments narrower and more acute. It occurs at a higher elevation than any other *Thelypteris* in Chiapas.

10. **Thelypteris oaxacana** A. R. Smith, Amer. Fern J. 63:125, figs. 7–8. 1973.

—Type: Mexico, Oaxaca, Ixtlán-Tuxtepec road, Km 126–129, *Smith 459* (UC!).

Illustration: only the original.

Rhizome erect; fronds ca. 60–95 cm long, 14–25 cm broad, with 6–10 pairs of gradually reduced basal pinnae, young fronds mucilaginous; stipe stramineous to tan, to 15 cm long, 5 mm diam.; rachis above with scattered hairs along the sulcus, glabrous below; pinnae 1.3–2.1 cm wide, broadest at their base, incised ca. 0.8 times their width, with prominent aerophores at their base; segments 3–5 mm wide, slightly oblique, not falcate, with rounded or subacute apex; veins 5–8 pairs per segment, glabrous; costae above with scattered acicular hairs 0.5 mm long, below epilose and towards the base with a few linear-lanceolate stramineous appressed scales; leaf tissue glabrous on both sides; sori medial, round, or slightly oblong, with prominent, persistent, glabrous indusia ca. 0.7 mm diam.; sporangia glabrous.

Edges of Montane Rain Forest, Pine-Oak Forest; uncommon, known from four scattered localities in the Northern Highlands (Jitotol Ridge), SE Central Plateau, and Sierra Madre; 1600–2100 m. Southern Mex. (Oax.), Salv., Nic. Chiapas Collections: *22845*; *32326*; *34402*; *42099*.

11. **Thelypteris oligocarpa** (Willd.) Ching, Bull. Fan Mem. Inst. Biol., Bot. 10:253. 1941.

—*Polypodium oligocarpum* Humb. & Bonpl. ex Willd., L. Sp. Pl., ed. 4, 5:201. 1810. —*Dryopteris oligocarpa* (Willd.) O. Ktze., Rev. Gen. Pl. 3:378. 1898. —Type: Venezuela, Caripe, *Humboldt & Bonpland s.n.* (B—Herb. Willd. 19699, pt.).

Dryopteris columbiana C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)4:279, fig. 8. 1907. —*Thelypteris columbiana* (C. Chr.) Morton, Leafl. W. Bot. 8:194. 1957. —Type: Colombia, *H. Smith 998* (P, not found; isotype UC!).

Illustration: Christensen (1907:275).

Rhizome erect; fronds mostly (30) 40–75 cm long, with 3–6 pairs of reduced basal pinnae, lowest of these a few mm long, 5–6 cm apart; stipe 4–13 cm long, 2–3 mm diam., often brownish, puberulous; rachis below usually with dense short hairs ca. 0.2 mm long, or with a few longer hairs intermixed; pinnae ca. 20 pairs, largest 5–8 (10) cm long, (1.0) 1.2–2.0 (2.6) cm broad, deeply incised to within 1 mm of costae; segments oblique, subfalcate, 2–3 mm broad, obtuse to acutish; veins 8–10 pairs per segment; costae, veins, and leaf tissue below with numerous hairs mostly 0.2–0.4 mm long, also with a few hamate hairs on leaf tissue, above with stout, stiff hairs 0.5–1.0 mm long on costae, costules, and veins, both sides eglandulose; leaf tissue thin; sori supramedial to submarginal, a very small indusium (concealed by mature sporangia) short-ciliate on margin; *n* = 29 (Chis., Ver.).

Along streams and wet banks in or adjacent to Montane Rain Forest, Pine-Oak-Liquidambar Forest; locally common in Northern Highlands, N Sierra Madre; 800–1700 m. Southern Mex. (Nay., Jal., Tam., Hgo., S.L.P., Ver., Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol.); Jam., Hisp., Cuba. Chiapas Collections: *21841*; *21848*; *27647*; *31348*; *32361*; *32491*; *32633*; *32706*; *32752*; *36659*.

Most Mexican specimens of this species match perfectly the type of *D. columbiana*, which Christensen distinguished from *D. oligocarpa* by the latter's having longer hairs on the rachis, pinnae more closely placed, and smaller blades. None of these distinctions seems to be taxonomically usable when a large series of specimens from throughout tropical America is studied; hence I apply the oldest name to Chiapas specimens. Monographic revision is needed.

12. **Thelypteris pilosohispida** (Hook.) Alston, J. Wash. Acad. Sci. 48:233. 1958.

—*Nephrodium pilosohispidum* Hook., Sp. Fil. 4:105. 1862. —*Dryopteris pilosohispida* (Hook.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:148. 1913. —Type: Ecuador, *Spruce s.n.* (K—2 sheets!).

Alsophila pilosa Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):78. 1842. —Type: Mexico [Veracruz], Totutla, *Galeotti 6405* (BR! isotypes BR—3 sheets!, K!).

Illustration: Christensen (1907:325, as *Dryopteris pterifolia*).

Similar to *T. rudis* but with fronds generally even larger; segments more or less perpendicular to costae, not falcate, the margin only slightly or not at all revolute; costae below with hairs longer (to ca. 1 mm long), softer, spreading rather than antrorse; costal scales larger, castaneous, not so clathrate; receptacle with a few stiff acicular hairs; *n* = 29 (Oax.).

Edges of Montane Rain Forest; widely scattered in Northern Highlands (Jitotol Ridge) and SE Central Plateau; 1300–1700 m. Southern Mex. (Ver., Oax.), Guat.; S.A. (Ven., Ecu.); Hisp. Chiapas Collections: *23152*; *32340*; *32635*; *32712*; *35278*.

Apparently growing at lower elevations than *T. rudis,* its closest relative.

13. **Thelypteris pilosula** (Mett.) Tryon, Rhodora 69:7. 1967.

—*Aspidium pilosulum* Mett., Fil. Hort. Bot. Lips. 130. 1856. —*Dryopteris pilosula* (Mett.) Hieron., Hedwigia 46:332. 1907. —Type: cultivated plant, said by Mettenius to have originated from Caracas [Venezuela]; a probably authentic specimen is at B! probable isotype: BR.

Illustration: none found.

Rhizome suberect or erect; fronds 50–100 cm long, to 35 cm broad, with ca. 5–7 pairs of gradually reduced basal pinnae; stipe tan to brownish, to 25 cm long, 5 mm diam., strigose with hairs mostly 1 mm or more long, with persistent spreading linear-lanceolate scales at base; pinnae 1.5–2.2 cm wide, incised ca. 0.8–0.9 times their width, without aerophores; segments 3–4 mm broad, oblique, not (or slightly) falcate, apex rounded to subacute; veins 6–10 pairs per segment; costae, costules, and veins above and below with stout patent, acicular hairs mostly 0.5–1.0 mm long, epaleate; leaf tissue glabrous on both sides, chartaceous (infrequently subcoriaceous); sori medial to supramedial, with prominent, persistent, marginally setose indusia ca. 0.4 mm diam., indusia also with a few minute short-stipitate glands; sporangia glabrous; *n* = 29, 58 (Oax., Chis.).

In Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak Forest; common in Central Plateau, Northern Highlands (Jitotol Ridge), S Sierra Madre; (1200) 1700–2800 m. Southern Mex. (Jal., Mich., Hgo., Pue. Ver., Oax.), Guat., Hond., Nic., C.R.; S.A. (Ven. and Col. to Peru); Jam., Hisp. Chiapas Collections: *G 200* (GH); *L&S 9891* (UC); *GM 85* (DS), "Palenque," probably erroneously; *22413*; *22663*; *23002*; *23150*; *26796*; *27221*; *31765*; *31886*; *32072*; *32356*; *32711*; *34634*; *41389*; *41711*; *42720*.

Not at all the same as *T. oligocarpa,* as suggested by Christensen (1913), differing from that species by the relatively large, persistent, medial indusia, stouter acicular (nonhamate) hairs, and firmer blade texture. It also occurs at higher elevations than *T. oligocarpa.*

An additional synonym is probably *Dryopteris tablaziensis* Christ, syntypes from Costa Rica (*Biolley 67,* P, not found; *Wercklé s.n.* [Herb. Costar. 17010] P!).

14. **Thelypteris resinifera** (Desv.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:63. 1953.

—*Polypodium resiniferum* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:317. 1811. —*Dryopteris resinifera* (Desv.) Weatherby, Contr. Gray Herb. 114:32. 1936. —Type: "Habitat in America calidiore," collector not stated (P!).

Nephrodium panamense Presl, Rel. Haenk. 1:35. 1825. —*Dryopteris panamensis* (Presl) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)4:292. 1907. —*Thelypteris panamensis* (Presl) E. St. John, Amer. Fern J. 26:44. 1936. —Type: Panama, *Haenke* (PRC?; probable isotype K!).

Polypodium litigiosum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:205. 1849. —Type: Mexico [Veracruz], "omkring Mirador," *Liebmann s.n.* (C! isotype K!).

Aspidium exsudans Fourn. var. *majus* Fourn., Mex. Pl. 1:93. 1872. —Syntypes: Mexico. Veracruz. Zacuapan, *Galeotti 6306* (presumably P; isosyntypes BR! K!—fragment US!); Oaxaca. *Franco s.n.* (presumably P).

Aspidium molliculum Fourn. var. *majus* Fourn., Mex. Pl. 1:94. 1872, nom. nud.

Aspidium ghiesbreghtii Fourn., Mex. Pl. 1:94. 1872. —Syntypes: Mexico. Veracruz. Orizaba, *Bourgeau 3615* (presumably P); without State. *Schiede s.n.* (P); *Ghiesbreght 407* (P, photo US!)

Illustration: Christensen (1907:293).

Rhizome erect; stipe stramineous to tan, usually mucilaginous when young, 1–3 (6) mm diam.; fronds (15) 25–100 (130) cm long, with up to 12 pairs of gradually reduced pinnae at base, stipes mostly less than 5 (15) cm long; rachis hairy to glabrescent, the hairs simple, to ca. 0.5 mm long; largest pinnae to 13 cm long, (0.4) 0.7–1.5 cm broad, incised to within 1 mm of costae; pinnae below with stout aerophores at their base, ascending in the upper two-thirds of lamina; segments very oblique to the costae, often falcate, deltoid to lanceolate, to ca. 2.5 mm broad; veins (3) 5–10 pairs per segment; costae and costules usually short-hairy below, hairs simple, mostly less than 0.3 mm long; leaf tissue below often short-hairy and usually with numerous golden to reddish, sessile, hemispherical, resinous glands; sori medial to supramedial, with persistent, tan, usually glandulose indusia; sporangia glabrous; n = 29, 58? (Ver., Jam.).

Along streams and roadside ditches in disturbed Tropical Rain Forest, Seasonal Evergreen Forest, Tropical Deciduous Forest, less often in Montane Rain Forest and Pine-Oak-Liquidambar Forest, rarely in Evergreen Cloud Forest; widespread in Northern and Central highlands, Sierra Madre, Pacific and Gulf coastal plains; 150–1500 (2300) m. Tropical and subtrop. Mex. (Chih., Sin., Nay., Jal., Mich., Gro., Méx., Mlos., Pue., Ver., Tab., Oax.), Guat. to Pan.; S.A. (Ecu.); Gr. Antill. (Jam., Cuba, Hisp.). Chiapas Collections: *EM 2766* (MEXU, NY); *20621*; *20622*; *22584*; *24031*; *25110*; *30671*; *31263*; *32478*; *33655*; *35049*.

Closely related to *T. opposita* (Vahl) Ching from which it differs in having linear, more oblique, falcate segments. *Thelypteris opposita* is a common species in the Lesser Antilles and South America. In Mexico and Central America, *T. resinifera* comes closest to *T. struthiopteroides* and *T. balbisii,* which see for additional discussion. A few collections of *T. resinifera* from northwest Chiapas tend toward *T. struthiopteroides* in blade dissection (e.g., *25110, 31263*). I tentatively place them here because of their sparsely hairy costae and leaf tissue below.

15. **Thelypteris rudis** (Kunze) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:64. 1953.

—*Polypodium rude* Kunze, Linnaea 13:133. 1839. —*Dryopteris rudis* (Kunze) C. Chr., Ind. Fil. 289. 1905. —Type: Mexico [Veracruz], "in silvis Jalapae," *Schiede s.n.*

Illustration: Christensen (1907:325).

Rhizome suberect; stipe to ca. 25 (45) cm long, 2–5 (8) mm diam., darkened, often bearing tuberculiform aerophores at intervals of 2–3 (7) cm, pubescent (infrequently glabrescent); lamina (including "abortive" pinnae) (35) 50–100 (125) cm long, to 45 cm broad, towards base with (3) 5–12 pairs of wartlike pinnae that can be easily overlooked; developed pinnae (5) 10–22 cm long, (1) 1.5–3 (4.5) cm broad, with a small aerophore at the base; segments slightly oblique and subfalcate, ca. 3–5 mm broad, rounded to acutish at apex, the margin slightly revolute; basal pair of segments considerably reduced in lower pinnae; costae below antrorsely strigose and with brownish to blackish subclathrate scales, especially toward the base; leaf tissue dark green when dried, chartaceous to subcoriaceous, pubescent on both sides or glabrous, the hairs mostly 0.2–0.3 mm long, those below sometimes hamate; sori supramedial, exindusiate; sporangia glabrous; n = 29 (Oax., Jam.).

On wet banks in or adjacent to Montane Rain Forest, Pine-Oak-Arbutus Forest, Evergreen Cloud Forest; common in Sierra Madre, Central Plateau, uncommon in Northern Highlands; (1700) 2100–3000 m. Southern and w Mex. (Baja C.S., Chih.?, Sin., Dgo., Nay., Jal., Mich., Gro., Méx., Mlos., Hgo., Pue., Oax., Ver.), Guat. to Pan.; S.A. (Ven. to Bol.); Gr. Antill. Chiapas Collections: *GM 42* (DS); *EM 2914* (GH, K, MEXU, NY); *L&S 9933,* aberrant in the serrate segments (US); *G 254* (GH, K, NY, PH); *15213*; *15264*; *22405*; *22603*; *22725*; *22934*; *25305*; *26242*; *26793*; *29416*; *31651*; *32032*; *32078*; *32652*; *33530*; *34806*; *40850*; *41262*; *41338*; *42529*.

This species and *T. pilosula* are the commonest *Thelypteris* above 2000 m. *Thelypteris rudis* varies widely in frond size and laminar pubescence, but the subclathrate costal scales and antrorse costal pubescence are relatively constant characters.

16. **Thelypteris scalaris** (Christ) Alston, J. Wash. Acad. Sci. 48:234. 1958.

—*Aspidium scalare* Christ, Bull. Herb. Boissier (2)6:159. 1906. —*Dryopteris scalaris* (Christ) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)4:323. 1907. —Lectotype (chosen by Christensen, 1907:324): Guatemala, Alta Verapaz, Cubilquitz, *v. Tuerckheim s.n.* (P, not found; isolectotype US!).

ILLUSTRATION: Christensen (1907:323).

Rhizome suberect to erect; fronds to 1.1 m long, with 7–11 pairs of gradually reduced basal pinnae, lowermost auriculiform, ca. 5 mm long; stipe to ca. 8 cm long, 2–3 mm broad with densely short-hairy scales at base; buds sometimes present toward distal part of rachis; pinnae subopposite, horizontal, to 45 pairs, the largest 6–11 cm long, 1.1–2.6 cm broad, incised to ca. 1 mm from costae; segments 2–4 mm broad, mostly rounded at tip, perpendicular to costae; veins 9–12 pairs per segment; costae and veins below with scattered to dense hairs to 0.3 mm long; leaf tissue herbaceous, eglandulose, below with erect hamate hairs to 0.3 mm long, above rather densely appressed-hairy (hairs 0.1 mm); sori supramedial, with small indusia that are marginally hamate-hairy; n = 29 (Oax.).

In Montane Rain Forest; scattered in Northern and Eastern highlands, Sierra Madre; 800–2200 m. Southern Mex. (Ver., Oax.), Guat., C.R., Pan.; S.A. (Ven., Col., Ecu.). CHIAPAS COLLECTIONS: *21844*; *25404*; *30140*; *31637*; *32704*; *32888*; *34386*; *34434*.

Collections from the vicinity of Cerro Tres Picos (*25404, 34386, 34434*) differ in having more oblique pinna segments, shorter, denser hairs on costae below, longer, more spreading, and less hairy rhizome scales, and in broader but more abruptly reduced blades with fewer pairs of reduced pinnae; additionally, the indusium is light greenish. These specimens probably represent a distinct variety or perhaps species.

Nearly all Oaxacan specimens bear minute buds along the distal portion of the rachis, but such buds are absent from Chiapas specimens.

17. **Thelypteris struthiopteroides** (C. Chr.) Reed, Phytologia 17:316. 1968.

—*Dryopteris struthiopteroides* C. Chr., Smithsonian Misc. Collect. 52:388. 1909. —TYPE: Guatemala, Escuintla, Concepción, *Donnell Smith 2459* (US! fragment BM!).

ILLUSTRATION: none.

With the characters of *Thelypteris balbisii* but differing from that species in having rather oblique segments and completely lacking acicular or long-septate hairs on the rachis, costae, or leaf tissue below; sparsely glandular to seemingly glabrous on indusial margins and leaf tissue below; lower pinnae usually gradually (not subabruptly) reduced.

Wet forests, slopes, and ditches, cafetals, in Seasonal Evergreen Forest; locally common in s Sierra Madre, s Pacific Coastal Plain; 150–450 (1000) m. Southern Mex. (Chis. only), Guat. CHIAPAS COLLECTIONS: *EM 18117* (DS, F, MEXU); *EM 18160* (F, MEXU, US); *22513*; *31584*; *31617* (atypical).

Closely related to *T. resinifera* and *T. balbisii*, and somewhat intermediate between them. *Thelypteris struthiopteroides* differs from *T. resinifera* in having glabrous fronds and broader, more deeply incised pinnae.

18. **Thelypteris tablana** (Christ) A. R. Smith, Amer. Fern J. 63:127. 1973.

—*Aspidium tablanum* Christ, Bull. Herb. Boissier (2)5:727. 1905. —*Dryopteris tablana* (Christ) C. Chr., Ind. Fil. 297. 1905. —TYPE: Mexico, Chiapas, San Pablo, *Münch 146* (P!; isotype DS!).

ILLUSTRATION: Christensen (1913:134).

Rhizome erect, 1 cm diam.; stipe 20 cm long, 1 mm diam., stramineous; lamina 25 cm long, 12 cm broad; pinnae opposite, 6–6.5 cm long, ca. 13 mm broad, lowermost several pairs deflexed and with at least one pair of greatly reduced auriculiform pinnae; segments ca. 3 mm broad, obtuse at apex, the margin plane; veins 4–5 pairs; costae above strigose, below glabrous; leaf tissue herbaceous, on both sides glabrous, eglandular; sori supramedial, with a persistent glabrous indusium; sporangia glabrous.

A poorly known species, the only collection being that of the type, from the northern part of the Central Plateau. Christensen (1913) compared this species to *T.* (*Goniopteris*) *blanda*, but its affinities are not at all with that species. Rather, *T. tablana* is close to *T. oaxacana*; it is possible that it is only an extremely depauperate specimen of that species.

The specific epithet *tablanum* was probably an error for "pablonum."

19. **Thelypteris thomsonii** (Jenm.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:65. 1953.

—*Polypodium thomsonii* Jenm., J. Bot. 24:272. 1886. —*Dryopteris thomsonii* (Jenm.) C. Chr., Ind. Fil. 298. 1905. —TYPE: Jamaica, *Jenman, J.P. 254* (IJ; isotypes NY, US). *Dryopteris stuebelii* Hieron., Hedwigia 46:340, pl. 6, fig. 13. 1907. —SYNTYPES: Colombia, *Stübel 439, 146* (B).

ILLUSTRATION: cited under synonym, above.

Rhizome erect, massive; stipe stramineous to tan, mucilaginous when young, 6–10 mm wide, with numerous, partly appressed, tan scales to ca. 8 mm long, 5 mm broad; fronds large, to 2.5 m (or more?) long, 60 cm broad, with pinnae abruptly reduced towards base and numerous wartlike pinnae less than 5 mm long; largest pinnae to 32 cm long, 2.0–4.4 cm broad, deeply incised to within 1 mm of costae, lower pinnae somewhat narrowed at base; prominent squamate aerophores to 6 mm long at base of costae below, smaller aerophores to 1 mm long often present at base of costules; veins up to 25 pairs per segment, meeting the margin above the sinus; costae and costules below densely hairy with fasciculate hairs ca. 0.1 mm long; leaf tissue below with numerous reddish, sessile, hemispherical, glutinous glands; indusia small, nearly obscured by dense reddish glands like those of lamina; sporangia glabrous; n = 58 (Jam.).

In Montane Rain Forest, Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, Sierra Madre; 1700–2300 m. Southern Mex. (Oax.), Guat., Salv., C.R.; S.A. (Col., Ecu.); Gr. Antill. (Jam., Hisp.). CHIAPAS COLLECTIONS: *23121*; *31981*; *31986*; *32345*; *32683*; *33695*.

Thelypteris subg. **Cyclosorus** (Link) Morton, Amer. Fern J. 53:153. 1963.

—*Cyclosorus* Link, Hort. Reg. Bot. Berol. 2:128. 1833. —*Dryopteris* subg. *Cyclosorus* (Link) C. Chr., Ind. Fil. xxi. 1906. —TYPE: *Aspidium gongylodes* Schkuhr [=*Thelypteris interrupta* (Willd.) Iwatsuki].

Rhizome creeping to erect, lamina pinnate-pinnatifid, lowermost pinnae reduced or not (most American spp.); aerophores absent or only a small darkened protuberance; lowermost veins of segments meeting the margin at the sinus or connivent just below sinus or meeting below sinus with an excurrent vein to the sinus; costae and veins below with unbranched, unicellular, acicular hairs and sometimes capitate glands; sori round, with a usually large, persistent, hairy indusium; sporangia with or without hairs or glands from sporangial stalks; spores bilateral, dark, with an often broadly winged perispore; $x = 36$.

In his revision of genera of Thelypteridaceae in the Old World, Holttum (Blumea 19:17–52. 1971) restricted the application of *Cyclosorus* to the type species and one other African species. Later (J. S. African Bot. 40:123–168. 1974), he concluded that the American species previously ascribed to *Cyclosorus* by Christensen and others had closest affinities to *Christella,* with perhaps 50 Old World species. While *Thelypteris dentata* and *T. hispidula* in the New World certainly do have affinities within *Christella,* I believe that the affinities of most of the remaining American *Cyclosorus* s.l. are still obscure; hence I apply *Cyclosorus* in a broader sense than does Holttum. Subgenus *Cyclosorus* in the New World contains 18 species, from southeastern United States, southern California, Arizona, and Mexico to northern Argentina and the Antilles. The greatest number of species is in southern Mexico and Guatemala.

a. Basal veins of adjacent segments united below the sinus with an excurrent vein to the sinus; costules, veins, and often leaf tissue above hairy.
b. Rhizome long-creeping (often with more than 3 cm between stipe bases), black, nearly naked; costae below with tan scales; leaf tissue above usually glabrous .... 25. *T. interrupta*
bb. Rhizome short-creeping to erect, brown, with inconspicuous scales; costae below without scales; leaf tissue and veins above pubescent with stout hairs.
c. Costae below with predominantly short, uniform hairs less than 0.1 (0.2) mm long; stipe and rachis usually darkened; rhizome short-creeping .... 23. *T. dentata*
cc. Costae below with most hairs greater than 0.3 mm long with many exceeding 0.5 mm; stipe and rachis usually stramineous; rhizome suberect .... 24. *T. hispidula*
aa. Basal veins of adjacent segments free or connivent at the sinus; costules, veins, and leaf tissue above with or without hairs.
d. Rachis and stipe conspicuously scaly .... 30. *T. tuerckheimii*
dd. Rachis and upper part of stipe not conspicuously scaly.
e. Rhizome erect, caudex 2–5 cm in diam.; basal segments of lower and middle pinnae usually elongate parallel to rachis; prominent auricles often present at base of lower pinnae; costae below without scales .. 28. *T. patens*
ee. Rhizome long- to short-creeping, stipes arcuate at the base; basal segments of lower and middle pinnae not greatly enlarged to form auricles, in some species reduced; costae below with or without scales.
f. Costae and often costules and veins above with at least a few rather stout hairs, mostly longer than 0.3 mm; lamina above often capitate-glandular .... 26. *T. kunthii*
ff. Costae, costules, and veins above glabrous or with very thin, short hairs mostly shorter than 0.2 mm, predominantly along the costae; lamina above eglandular.
g. Stipe base scales very dark brown, bristlelike; indusia densely long-hairy; costae below glabrous or sparsely hairy .... 21. *T. blepharis*
gg. Stipe base scales tan, linear-lanceolate to ovate-lanceolate; indusia hairy or glabrous; costae below hairy or glabrous.
h. A few narrow scales 1–3 mm long persistent on rachis; basal segments of pinnae usually somewhat elongate parallel to rachis; pinnae incised more than 0.8 their width; sori submarginal; hairs on costae below and indusia sparse or moderately dense, acicular ...... 27. *T. ovata* var. *lindheimeri*
hh. Scales mostly absent from rachis, if present less than 1 mm long; basal segments of pinnae not elongate parallel to rachis; pinnae incised 0.7–0.8 their width; sori medial to submarginal; indusia and costae below glabrous or with dense subflexuous hairs.
i. Indusia, costae, and leaf tissue below with short, rather dense hairs .... 29. *T. puberula* var. *puberula*
ii. Indusia and costae below without hairs or sparsely hairy.
j. Scales absent on costae below; indusia brownish .... 22. *T. cretacea*
jj. Scales present on costae below; indusia reddish .... 20. *T. albicaulis*

20. Thelypteris albicaulis (Fée) A. R. Smith, Univ. Calif. Publ. Bot. 59:94. 1971.

—*Aspidium albicaule* Fée, Mém. Fam. Foug. 8:102. 1857. —TYPE: "Vallee du Mexique," *Schaffner 245* (P!).
Aspidium geropogon Fée ex Fourn., Mex. Pl. 1:95. 1872. —*Dryopteris geropogon* (Fourn.) C. Chr., Ind. Fil. 267. 1905. —*Dryopteris augescens* (Link) C. Chr. var. *geropogon* (Fourn.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:185. 1913. —SYNTYPES: six collections from s Mex. and one from Cuba (presumably P). *Bourgeau 1319* (P! isosyntypes C! GH!) and *Galeotti 6311* (P!) are this species; *Bourgeau 1318* (P!) is *T. puberula*; others not found.
ILLUSTRATION: none.

Rhizome long-creeping, to 8 mm diam.; stipe puberulous, epaleate or nearly so, (25) 40–75 cm long, 4–7 mm diam.; rachis glabrous or sparsely hairy; lamina to 70 cm long, often narrowed rather abruptly toward the somewhat elongate tip; lower and longest (or nearly so) pinnae (10) 15–25 cm long, (0.9) 1.4–2.5 cm wide, never auricled, narrowed at base, especially along basiscopic side; pinnae incised 0.5–0.7 their width; segments oblique, falcate, acute at tip, (2) 3–4 mm wide at base; veins 10–16 pairs per segment, lowest pair (1.5 pairs) of veins from adjacent segments connivent at the raised sinus membrane; costae, veins, and leaf tissue below without hairs or very sparsely hairy along costae and costules, above glabrous except for sparse hairs 0.1 mm long along costae; costae below with a few dark-castaneous, short-hairy scales; sori medial to supramedial; indusia glabrous or infrequently sparsely hairy, usually drying reddish; spores ca. 35 μm long, with a short-spinulose perispore.

Known from five scattered localities in Pine-Oak-Liquidambar Forest, Montane Rain Forest; Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1250–1700 m. Southern Mex. (Jal., Mich., Gro., Méx., Mlos., Ver., Oax.). CHIAPAS COLLECTIONS: *EM 5178* (MEXU, US); *32532*; *32758*; *33394*; *40095*.

A putative hybrid between *T. albicaulis* and *T. ovata* is *Breedlove 22172* (DS), 6–8 km north of Ococingo; it has abortive spores. In Oaxaca, *T. albicaulis* probably hybridizes with *T. puberula*. From both of these species, *T. albicaulis* differs by its glabrous or near-glabrous blades and reddish indusia.

21. **Thelypteris blepharis** A. R. Smith, Proc. Calif. Acad. Sci. (4)40:227, fig. 7, F–H. 1975.

—TYPE: Mexico, Chiapas, Munic. La Independencia, road from Las Margaritas to Campo Alegre, *Breedlove 33605* (DS!).

ILLUSTRATION: only the original.

Rhizome creeping; stipe 20–40 cm long, 4–6 mm diam., brownish or weakly purplish, bearing numerous, spreading, linear-lanceolate scales to 8 mm long, 1 mm wide, these glabrous or minutely glandular on margin, dark-castaneous, shining; rachis with a few similar scales, tan; blade chartaceous or subcoriaceous, dark green, 50–70 cm long, 30–36 cm broad, gradually tapering to a pinnatifid apex; pinnae to 19 cm long, 2.1 cm broad, incised nearly to costae; segments oblique, subfalcate, acute or obtuse at apex, basal segments of lower pinnae only slightly or not at all enlarged; veins up to 13 pairs per segment, the lowermost meeting margin at or just above sinus; rachis, costae, and veins below without hairs or sparsely hairy, sometimes with scattered, stipitate, yellowish, minute glands, above with hairs to ca. 0.5 mm long along costae and rachis; leaf tissue on both sides glabrous; sori medial; indusia reddish brown, glandular, densely long-hairy, with hairs to ca. 1 mm long.

Known in Chiapas only from the type, on rocks, in Evergreen Cloud Forest; Central Plateau; 2300 m. Elsewhere, known only from Guatemala, Dept. Huehuetenango (single collection).

22. **Thelypteris cretacea** A. R. Smith, Univ. Calif. Publ. Bot. 59:92, fig. 118c. 1971.

—TYPE: Costa Rica, Guanacaste, *Mickel 2867* (NY! isotypes ISC! UC!).

ILLUSTRATION: only the original.

Rhizome short-creeping, paleate at apex, scales tan, ovate-lanceolate, 3–4 mm by 1–1.5 mm, glabrous, with cells ± isodiametric; fronds 20–60 (100) cm long; stipe 5–35 (50) cm long, 1.5–4 (7) mm wide, stramineous, basal scales like those of rhizome, otherwise glabrous; rachis glabrous or with short, capitate glands; lamina gradually tapering distally; pinnae 5–10 (17) cm long, (0.6) 0.9–1.5 (2.1) cm wide, incised (0.5) 0.7–0.8 their width, widest at base; segments oblique, subfalcate, 2–3 (4) mm wide, basal segments of lower pinnae sometimes slightly auriculate; veins (4) 6–9 (12) pairs per segment, lowermost meeting margin at the sinus or nearly so; costae, veins, and leaf tissue glabrous on both sides or below with sparse hairs 0.3 mm long and/or glands, these capitate (less than 0.1 mm long), yellowish, often numerous; sori supramedial, with glabrous or very sparsely hairy indusia, also with numerous glands; spores 34–43 μm long; $n = 36$ (C.R.).

Along rocky stream banks in Seasonal Evergreen Forest, Tropical Rain Forest; rare in Northern Highlands, Central Depression; 300–900 m. Southern Mex. (Ver.), Guat., Salv., Nic., C.R. CHIAPAS COLLECTIONS: *R&R&M 983* (MICH); *35367* (atypical).

23. **Thelypteris dentata** (Forssk.) E. St. John, Amer. Fern J. 26:44. 1936.

—*Polypodium dentatum* Forssk., Flora Aegypt.-Arab. 185. 1775. —*Dryopteris dentata* (Forssk.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (8)6:24. 1920. —*Cyclosorus dentatus* (Forssk.) Ching, Bull. Fan Mem. Inst. Biol., Bot. 8:206. 1938. —TYPE: Yemen, *Forsskål s.n.* (C!).

Aspidium molle Swartz, J. Bot. (Schrader) 1800(2):34. "1801" [1802]. —*Dryopteris mollis* (Swartz) Hieron., Hedwigia 46:348. 1907. —TYPE: cultivated specimen (W!).

ILLUSTRATIONS: Smith (1971:58); Small, Ferns SE States 255. 1938 (as *T. reducta*).

Rhizome short-creeping; fronds somewhat dimorphic, the sterile shorter and with fewer, wider pinnae than the fertile; stipe darkened, often purplish, 15–45 cm long, 3–5 mm in diam., paleate at base; blade herbaceous or chartaceous, (24) 40–92 cm long, tapering evenly toward the pinnatifid apex; largest pinnae 7–17 cm long, 1.1–2.7 cm wide, incised 0.5–0.8 to costa; lower (1) 2–6 pairs of pinnae reduced, auricled at the superior base, auricles entire or crenate; veins 6–10 pairs per segment, basal pair from adjacent segments united at an obtuse angle below sinus with an excurrent veinlet 2–4 mm long; costae, costules, and leaf tissue pubescent below, the hairs dense, uniformly short, 0.1–0.2 mm long, occasionally with scattered longer hairs, above with hairs longer and stouter except on leaf tissue; glands usually absent on blades; indusia uniformly pubescent, with hairs 0.1–0.2 mm long; $n = 72$ (Fla., Hisp., O.W.).

Naturalized and becoming increasingly common in the New World, especially along ditches, roadsides, edges of woods, wet banks, cafetals; Northern Highlands, SE Central Plateau, Pacific and Gulf coastal plains, Sierra Madre; 150–1700 m. Southern Mex. (Oax., Ver.), Guat., Nic., C.R.; S.A.; SE U.S.; W.I.; Old World tropics and subtropics. CHIAPAS COLLECTIONS (all since 1970): *21627*; *21837*; *22292*; *22518*; *28144*; *30687*; *32182*; *32367*; *32705*; *34915*; *36662*; *38096*; *39060*.

24. **Thelypteris hispidula** (Decne.) Reed, Phytologia 17:283. 1968.

—*Aspidium hispidulum* Decne., Nouv. Ann. Mus. Hist. Nat. 3:346. 1834. —*Christella hispidula* (Decne.) Holtt., Kew Bull. 31:312. 1976. —TYPE: Timor, *Guichenot s.n.* (P).

Thelypteris quadrangularis (Fée) Schelpe, J. S. African Bot. 30:196. 1964. —*Nephrodium quadrangulare* Fée, Gen. Fil. 308. 1852. —*Dryopteris quadrangularis* (Fée) Alston *in* Box and Alston, J. Bot. 75:253. 1937. —TYPE:

French Guiana, *Leprieur 182* (isotypes NY! P!—2 sheets).
Illustration: Smith (1971:65).

Rhizome suberect to erect (short-creeping to long-creeping in two non-Chiapas varieties), caudex usually 1.5–3 cm diam.; stipe stramineous, but darkened at the base, 10–40 (55) cm long, 1.5–5 mm diam., hairy; lamina herbaceous to chartaceous, 18–55 (75) cm long, tapering evenly to the pinnatifid apex; largest pinnae 3.5–16 cm long, 0.8–2.0 (2.6) cm wide, incised (0.5) 0.6–0.8 to costa; 0–4 pairs of lower pinnae gradually reduced at blade base; lower pinnae sometimes with small crenately lobed auricles at the superior base; segments suboblique, mostly straight, acute or rounded; veins (4) 6–9 (11) pairs per segment, basal pair from adjacent segments united below sinus with an excurrent veinlet 1–2 mm long (ours); costae and veins pubescent on both sides, hairs often stout, 0.3–0.8 mm long; leaf tissue pubescent below, glabrous or hairy above; stipitate yellow glands often present on both surfaces; indusia usually with dense hairs less than 0.3 mm long; $n = 36$ (Fla., La., O.W.).

Along streams and in ravines, in Tropical Deciduous Forest, Seasonal Evergreen Forest; uncommon on Pacific slope of Sierra Madre; 800–1000 m. Tropical Mex. (Tam., Ver., Son., Sin., Nay., Jal., Mich., Oax., Tab.), Guat., Bel., Hond., Salv., Nic., C.R., Pan.; S.A. (to N Arg., Urug., Parag., Bol.); SE U.S., Antill., Trin.; Africa and probably Asia. Chiapas Collections: *EM 18156* (F, MEXU, US); *25230*; *30557*; *31268*.

Holttum (Kew Bull. 31:293–339. 1976) recently revised the Old World species of *Christella* and concluded that *Christella hispidula* (Decne.) Holtt. is the oldest name for the pantropical diploid cytotype previously known under a wide variety of names (e.g., basionyms *Dryopteris contigua* Rosenst., *Nephrodium hilsenbergii* Presl, and *Nephrodium quadrangularis* Fée). I have now seen sufficient African and Asian material to agree that it is conspecific with what I have called *Thelypteris quadrangularis* in the Neotropics (Smith, 1971). The four New World varieties that I recognized previously are more or less distinct, insofar as New World material is considered, but I am uncertain of the relationship of the most widespread of them, the one I called var. *quadrangularis* (the only variety in Chiapas), to Old World varieties. In any case, an infraspecific taxonomy of Paleotropic material has not yet been attempted, so I believe it is premature to try to relate varieties in the two areas and thus to apply a varietal name to Chiapas collections.

Thelypteris hispidula has often been confused with *T. dentata*, native to Africa and Asia but introduced into the New World (Taxon 19:871–874).

25. **Thelypteris interrupta** (Willd.) Iwatsuki, Jap. J. Bot. 38:314. 1963.

—*Pteris interrupta* Willd., Phytogr. 13, pl. 10, fig. 1. 1794. —Type: southern India, *Klein s.n.* (B—Herb. Willd. 19770, 2 sheets).

Polypodium tottum Thunb., Prodr. Pl. Cap. 172. 1800. —*Thelypteris totta* (Thunb.) Schelpe, J. S. African Bot. 29:91. 1963. —*Cyclosorus tottus* (Thunb.) Pic. Ser., Webbia 23:173. 1968. —Type: South Africa, Thunberg Herbarium no. 24724 (UPS!).

Aspidium gongylodes Schkuhr (as "goggilodus"), Kr. Gew. 1:193, pl. 33c. 1809. —*Cyclosorus gongylodes* (Schkuhr) Link, Hort. Berol. 2:128. 1833. —*Dryopteris gongylodes* (Schkuhr) O. Ktze., Rev. Gen. Pl. 2:811. 1891. —*Thelypteris gongylodes* (Schkuhr) Small, Ferns SE States 248, cum tab. 1938. —Type: British Guiana [=Guyana], Essequebo, received by Gärtner (isotypes S, B).

Nephrodium paludosum Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:275. 1849. —Type: Mexico, Veracruz, "circa San Antonio Huatusco," *Liebmann* [Fl. Mex. nos. 492, 493 (lectotype, chosen by Smith, 1971:56), 494; all Liebm. Pl. Mex. 2658] (C! photos UC! fragment US!).

Illustrations: Smith (1971:55); Small, Ferns SE States 249. 1938; Holttum, Allertonia 1:178. 1977.

Rhizome long-creeping, black, naked, 3–6 mm diam., stipe bases (1) 2–9 cm apart, often blackened; stipe 17–105 cm long, 3–6 mm diam., glabrescent; lamina chartaceous to subcoriaceous, 30–80 cm long, tapering evenly toward the short-pinnatifid apex; largest pinnae 7–30 cm long, 1.0–2.2 cm wide, incised 0.3–0.5 (0.6), lowermost short-stalked 1–4 mm; segments deltoid, rounded or acute at tip; veins 9–18 pairs per segment, basal pair from adjacent segments obtusely united below sinus with an excurrent vein usually 2–4 mm long; scales on costae below, these tan or stramineous, glabrous or ciliate; costae, veins, and leaf tissue glabrous (ours) or pubescent (hairs 0.1–0.2 mm) below, glabrous above except for sparse hairs less than 0.2 mm long along costae; glands often present below, these red or orange, shining, sessile, hemispherical, most frequent on leaf tissue, along costules, and among sporangia; sori often appearing confluent when sporangia mature; indusia glabrous (ours) or hirsute; $n = 72$ (Fla., Jam.), 36 (O.W.).

In marshes and swamps; known from two localities in Northern and Eastern highlands; 800–1700 m. Southern Mex. (Nay., Ver., Tab.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (to N Arg., Urug., Parag.); s Fla., Antill.; O.W. trop. and subtrop. Chiapas Collections: *29945*; *32555*; *32717*; *33042*.

Three Neotropical varieties have usually been recognized, largely on the basis of glandularity and pubescence; their ranges are for the most part sympatric, and it is questionable whether this variation is taxonomically significant. For the present, I prefer to recognize a single, highly variable species without infraspecific divisions. All Chiapas specimens seen are without hairs on blade and indusia. The key given by Holttum (J. S. African Bot. 40:151. 1974) to separate African specimens of *Cyclosorus tottus* and *C. interruptus* cannot be used for our Neotropical specimens; I find no correlation between hairlessness and eglandularity.

26. **Thelypteris kunthii** (Desv.) Morton, Contr. U.S. Natl. Herb. 38:53. 1967.

—*Nephrodium kunthii* Desv., Mém. Soc. Linn. Paris 6:258. 1827. —Lectotype (designated by Morton, op. cit.:54): [Venezuela], "Cumanacoa, Caripe," *Humboldt & Bonpland s.n.* (P—Humboldt Herb.!).

Thelypteris normalis (C. Chr.) Moxley, Bull. S. Calif. Acad. Sci. 19:57. 1920. —*Dryopteris normalis* C. Chr., Ark. Bot. 9(11):31. 1910. —Lectotype (chosen by Smith, 1971): Jamaica, *Jenman s.n.* (NY).

Illustrations: Small, Ferns SE States 235. 1938 (also p. 247, *Thelypteris unca*).

Rhizome short- to long-creeping; stipe (5) 20–80 cm long, (1) 3–6 mm diam., with basal scales castaneous, shining, lanceolate, hairy; rachis pubescent and often stipitate-glandular, usually without scales; lamina herbaceous to chartaceous, (9) 30–65 (80) cm long, tapering evenly to the pinnatifid apex;

largest pinnae basal, (2) 8–15 (20) cm long, (0.6) 0.9–2.5 cm broad, incised 0.6–0.8, without pronounced basal auricles; segments oblique, straight or subfalcate, rounded or acute at tip; veins (3) 6–11 pairs per segment, basal pair from adjacent segments running to sinus; scales absent on costae below; costae and veins pubescent above and below, hairs mostly 0.2–0.5 mm long, dense or relatively sparse, those of costae above stouter, to 0.8 mm long; leaf tissue above usually lacking hairs, below hairy; light yellowish stipitate glands often present on leaf tissue and veins above and below; indusia sparsely to densely hairy, hairs 0.2–0.4 mm long; *n* = 72 (Jam., C.R., se U.S.).

Ravines, along streams, and in woods, Seasonal Evergreen Forest, margins of Tropical and Montane rain forests; widely scattered in Northern and Eastern highlands, n Sierra Madre, e edge of Central Plateau; 350–1300 m. Southern and e Mex. (s Tam., S.L.P., Ver., Camp., Q. Roo, Yuc.), Guat., Bel., Salv., Hond., Nic., nw C.R.; se U.S., Bah. Is., Antill.; rare in n S.A. (Ven., n Braz.). Chiapas Collections: *G 372* (NY); *21849*; *22154*; *22334*; *31266*; *32904*; *34460*; *36904*; *38102*.

27. **Thelypteris ovata** R. St. John var. **lindheimeri** (C. Chr.) A. R. Smith, Amer. Fern J. 61:30. 1971.

—*Dryopteris normalis* C. Chr. var. *lindheimeri* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:182. 1913. —Type: Texas, *Lindheimer 742* (B! IJ, MO! UC! US!).

For complete synonymy, see Smith (1971).

Illustration: Smith (1971:86, *T. ovata* var. *ovata*).

Rhizome creeping; fronds (30) 55–135 (165) cm long, tapering evenly toward the pinnatifid apex; stipe about as long as blade, (1.5) 2–6 mm diam., scales at base linear-lanceolate, tan to brown, ciliate; rachises with a few similar tan scales; largest pinnae (5) 10–25 cm long, 0.8–2.2 cm wide, incised more than 0.8; lowermost pinnae longest, often somewhat narrowed toward their base; basal segments of medial pinnae often narrower and slightly longer than more distal segments, often parallel to rachis; segments oblique, subfalcate; veins 6–13 pairs per segment, lowermost reaching margin at or just above sinus; tan scales 0.5–1.5 mm long on costae below; costae, veins, and leaf tissue pubescent below (hairs mostly 0.2–0.5 mm long), glabrous above except along costae; sori supramedial to submarginal; indusia with hairs mostly 0.2–0.4 mm long; paraphyses lacking; spores 31–42 (47) μm long; *n* = 36 (Tex.).

Limestone-fissured slopes, roadsides, and stream banks in Seasonal Evergreen Forest, Lower Montane and Montane rain forests; locally common in Northern Highlands; 700–1350 m. Eastern and s Mex. (N.L., Tam., Chih., Coah., Nay., Hgo., S.L.P., Gro., Pue., Ver.), Bel., Guat.; cen. Tex. Chiapas Collections: *19931*; *21876*; *22443*; *32463*; *33782*.

Variety *ovata* occurs in southeastern United States (South Carolina to Alabama) and Bahamas. A single collection of *T. ovata* is known from Jamaica.

28. **Thelypteris patens** (Swartz) Small, Ferns SE States 243. 1938.

—*Polypodium patens* Swartz, Prodr. Veg. Ind. Occ. 133. 1788. —*Dryopteris patens* (Swartz) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —Lectotype (chosen by Smith, 1971:74): Jamaica, *Swartz s.n.* (S!).

For additional synonymy, see Smith (1971).

Illustrations: Smith (1971:73); Small, Ferns SE States 244. 1938.

Rhizome erect, caudex 2–4 cm thick, apex and stipe bases covered with large, ovate, tan (whitish when young) scales to 1.5 by 0.5 cm, with cells isodiametric; stipe (5) 15–50 (95) cm long, (1) 2.5–9 (12) mm diam.; lamina (8) 25–75 (100) cm long, tapering evenly toward apex; largest pinnae (lowest or next to lowest) (3) 10–32 cm long, (0.5) 1.2–3.0 (4.0) cm wide (excluding basal segments, which may be elongate parallel to rachis or pinnatifid auricles to 5 cm long), usually deeply incised 0.7–0.9 their width; segments oblique, subfalcate to falcate, acute; veins (6) 8–14 (21) pairs per segment, basal pair from adjacent segments running to sinus; scales absent on costae; costae, veins, and leaf tissue below pubescent and often with short-stipitate glands, sometimes sparsely hairy (rarely glabrous), above glabrous except along costae, hairs mostly 0.2–0.4 mm long; indusia tan, often with short-stipitate glands, pubescent to sparsely hairy; *n* = 36 (Chis.), 72 (Jam., C.R.).

Along streams, roadsides, and open forests; Seasonal Evergreen Forest, Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest; common and widespread in Northern and Eastern highlands, Sierra Madre, e Central Plateau, Pacific Coastal Plain; 200–1000 (1700) m. Southern Mex. (Oax., Ver.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (to nw Arg., s Braz.); s Fla., Antill. Chiapas Collections: *G 379* (YU); *EM 199* (MEXU, MICH); *21637*; *22191*; *22539*; *26448*; *26532*; *31264*; *32759*; *33149*; *33363*; *33922*; *34151*; *34632*; *34965*; *39055*; *40108*.

The commonest variety (and the only one occurring in Chiapas) is var. *patens*. Two other varieties of this widespread species occur in the Neotropics, one in southern Brazil and adjacent countries, and the other widespread from the Antilles through much of South America, with a few collections from Central America. *Thelypteris patens* usually occurs at lower elevations than does *T. puberula*, also common and sometimes confused with *T. patens*.

29. **Thelypteris puberula** (Baker) Morton, Amer. Fern J. 48:138. 1958.

—*Nephrodium puberulum* Baker *in* Hook. & Bak., Syn. Fil., ed. 2, 495. 1874. —*Dryopteris puberula* (Baker) O. Ktze., Rev. Gen. Pl. 2:813. 1891. —*Dryopteris feei* C. Chr., Ind. Fil. 264. 1905. —*Dryopteris augescens* (Link) C. Chr. var. *puberula* (Baker) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:184. 1913. —Type: Mexico, Veracruz, near Huatusco, *Schaffner 247* in part (not found at P).

Illustrations: Smith (1971:90); Matuda, Anales Inst. Biol. Univ. Nac. México 27:121. 1956.

Rhizome creeping, stipe bases (0.5) 1–3 cm apart; stipe equaling blade, 15–50 (80) cm long, (2) 3–7 mm diam., paleate at base, scales hairy, not persistent; lamina chartaceous to subcoriaceous, 20–55 (85) cm long, tapering evenly toward the pinnatifid apex, or lamina abruptly expanded just below the somewhat elongate apex; largest pinnae lowest, 7–20 (26) cm long, 0.9–2.0 (3.0) cm wide, incised 0.5–0.8 their width; lower several pairs of pinnae narrowed toward their base except for a slightly enlarged entire acroscopic basal segment; basal basiscopic segment of distal pinnae strongly adnate to rachis; segments oblique, subfalcate, acutish; veins 7–12 (15) pairs per segment, basal pair (or 2–3 pairs) from adjacent segments connivent at the sinus; costae below with a few minute castaneous scales less than 0.5 mm long; costae, veins, and leaf tissue pubescent below (hairs ca. 0.2 mm long), eglandular or sparsely glandular, glabrous above except along costae; indusia hairy; *n* = 72 (Chis., Oax.).

Along streams, wet slopes, ravines, roadsides; Tropical Deciduous Forest, Seasonal Evergreen Forest, Montane Rain

Forest; common in Northern Highlands, Central Plateau, Central Depression, Sierra Madre; 500–2150 m. Nearly throughout Mexico, sw U.S., Guat., Salv., Hond., Nic., C.R. CHIAPAS COLLECTIONS: *Li 1529* (K); *R 1055* (PH); *G 236* (YU); *La 215* (DS, F); *MC 2166* (US); *C&D 94* (US); *C&D 203* (US); *Gi 4143, 4236* (NY); *21724*; *22335*; *22570*; *23072*; *23249*; *23345*; *26030*; *27029*; *31265*; *32290*; *32370*; *33392*; *33801*; *34323*.

All Chiapas material is referable to var. *puberula*; variety *sonorensis,* with lamina short-pubescent above, is confined to western Mexico and southwestern United States. Hybrids between *T. puberula* and other species in subg. *Cyclosorus* occur infrequently in Mexico and Guatemala, e.g., *T. albicaulis* × *puberula,* known from Oaxaca. *Breedlove 33725,* collected along road from Las Margaritas to Campo Alegre, has abortive spores and appears to be a hybrid involving *T. puberula* as one of its parents.

30. **Thelypteris tuerckheimii** (Donn.-Smith) Reed, Phytologia 17:321. 1968.

—*Nephrodium tuerckheimii* Donn.-Smith, Bot. Gaz. (Crawfordsville) 12:133, pl. 11. 1887. —*Dryopteris tuerckheimii* (Donn.-Smith) C. Chr., Ind. Fil. 299. 1905. —TYPE: Guatemala, Alta Verapaz, near Cobán, *Tuerckheim s.n.,* ed. Donn.-Smith 704 (US; isotypes B! GH, K, NY! P, UC! US!).
ILLUSTRATIONS: original; also, Smith (1971:70).

Rhizome stout, creeping; stipe 30–85 cm long, 4–10 mm diam. at base, densely clothed with brown or light brown ovate-lanceolate scales to 10 mm long, scales glabrous; rachis pubescent, moderately but still conspicuously scaly, the scales like those of stipe but smaller; blade coriaceous to subcoriaceous, (30) 45–90 cm long, (16) 25–55 cm wide, tapering evenly toward the short-pinnatifid apex; largest pinnae basal, (8) 12–28 cm long, 1.3–3.0 cm broad, incised ca. 0.7–0.8 to costa, often strongly auricled at base; segments subfalcate, the margins often strongly revolute; veins 10–18 pairs per segment, basal ones connivent to sinus; scales present on costae and costules below; costae, veins, leaf tissue, and indusia rather densely pubescent below, the hairs mostly 0.3–0.5 mm long; $n = 36$ (Chis.).

Fissured limestone slopes, sink holes, banks, margins of Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest, Seasonal Evergreen Forest; locally common in Northern Highlands, Central Plateau; 700–2700 m. Elsewhere, known only from Guatemala. CHIAPAS COLLECTIONS: *MC 1836* (US); *22336*; *22448*; *23535*; *27938*; *29577*; *32150*; *33426*; *33628*; *34633*; *34680*; *42059*.

In general, Chiapas specimens are less scaly than material from Guatemala; in this respect, they resemble more closely *T. ovata* var. *lindheimeri.*

Thelypteris subg. **Goniopteris** (Presl) Duek, Adansonia (2)11:720. 1971.

—*Goniopteris* Presl, Tent. Pterid. 181. 1836. —*Dryopteris* Adanson subg. *Goniopteris* (Presl) C. Chr., Ind. Fil. xxii. 1906. —*Thelypteris* sect. *Goniopteris* (Presl) Morton, Amer. Fern J. 53:154. 1963. —LECTOTYPE (chosen by J. Smith, Hist. Fil. 191. 1875): *Polypodium crenatum* Swartz [=*Thelypteris poiteana* (Bory) Proctor].

Rhizome with numerous, thick, proplike roots ca. 1 mm diam., these seemingly glabrous; rhizome apex and stipe base scales few, usually beset with minute, forked or stellate hairs ca. 0.1 mm long; fronds rarely simple, mostly pinnate or pinnate-pinnatifid, gradually reduced toward the pinnatifid apex or with a conform terminal pinna; gemmiparous buds sometimes present in axils of distal pinnae; lowermost pinnae longest or nearly so, rarely reduced; axes and leaf tissue, especially abaxially, with few to many stellate or forked hairs, also with acicular hairs, rarely with only acicular hairs (*T. ghiesbreghtii*); aerophores absent; leaf tissue dark green or gray-green, sometimes verruculose; veins connivent at sinus or with one to several pairs of veins united below sinus, rarely free; indusia present or absent, often minute and easily overlooked; sporangia glabrous or often setose with acicular or stellate hairs; $x = 36$.

Species of subg. *Goniopteris* are restricted to New World tropics and subtropics, from Florida, Antilles, and central Mexico to Bolivia and northeastern Argentina. Sixteen of the 18 Mexican species have been found in Chiapas (Smith, 1973); altogether there are perhaps 75 species in the subgenus. *Goniopteris* is primarily a group occurring in low to middle elevation rain forests, with species becoming rare above 1500 m and nonexistent above 2000 m.

a. Veins meniscioid, i.e., 3 or more pairs of veins from adjacent segments anastomosing with an excurrent vein that ends before reaching the next pair of anastomosing veins.
  b. Sporangial walls with several short setae; meniscioid veins 3–5-seriate; costae below moderately hairy, hairs mostly 0.2–0.4 mm long .... 42. *T. poiteana*
  bb. Sporangial walls glabrous (rarely with a few minute setae in *T. meniscioides*); meniscioid veins 7–12-seriate.
    c. Costae, veins, and leaf tissue moderately to densely hairy below, the hairs to 1.5 mm long, with many hairs ca. 1.0 mm long .... 33. *T. ghiesbreghtii*
    cc. Costae, veins, and leaf tissue glabrous or nearly so below, hairs, if present, less than 0.2 mm long .... 36. *T. meniscioides*
aa. Veins free, or connivent at sinus, or the lower 1–2 (3) pair(s) united with an excurrent vein to sinus.
  d. Fronds arching, radicant at or near tip and producing new fronds; pinnae 2.5 cm long or less, entire to lobed ca. 0.25 their width .... 43. *T. reptans*
  dd. Fronds not rooting at tip (a few species producing rachis buds back from tip); pinnae longer than 2.5 cm, shallowly to deeply lobed more than 0.75 their width.
    e. Lamina with a terminal pinna resembling the lateral ones; sporangia with or without minute setae or furcate hairs.

f. Sori supramedial to submarginal; indusia persistent and relatively large .... 41. *T. paucipinnata*

ff. Sori subcostular to supramedial; indusia absent or minute and easily overlooked.

g. Pinnae serrulate to lobed one-third to costae, cuneate at base; basal veins upcurved and anastomosing under acute angles, the following pairs usually also anastomosing .... 40. *T. obliterata*

gg. Pinnae incised 0.5–0.8 to costae, truncate or cuneate at base; only basal pair of veins anastomosing at an obtuse angle, or veins connivent at the sinus.

h. Rachis, costae, costules, and veins below glabrous .... 47. *T. toganetra*

hh. Rachis, costae, costules, and often veins below sparsely to densely hairy.

i. Lowermost veins united at an obtuse angle with an excurrent vein to sinus; sporangia setose .... 46. *T. tetragona*

ii. Lowermost pairs of veins from adjacent segments connivent at the sinus; sporangia glabrous or setose.

j. Pinnae elliptic in outline, gradually narrowed at their base; pinnae relatively few, often 3–6 lateral pairs .... 39. *T. nicaraguensis*

jj. Pinnae linear, not greatly narrowed at their truncate base, or abruptly narrowed; pinnae usually more than 6 lateral pairs.

k. Lower pinnae not greatly narrowed at their truncate base; rhizome short-creeping .... 35. *T. imbricata*

kk. Lower pinnae abruptly reduced at their base, usually with two greatly reduced rounded lobes; rhizome erect .... 37. *T. minor*

ee. Lamina without a distinct terminal pinna, upwards gradually narrowed into a pinnatifid apex; sporangia glabrous.

l. Costae and sometimes veins and leaf tissue below with rather dense stellate or furcate hairs.

m. Fronds small, shorter than 45 cm; indusia absent; stellate hairs lacking on leaf tissue, all stalked on costae and rachis .... 45. *T. stolzeana*

mm. Fronds longer than 45 cm; indusia absent or present (small); stellate hairs on leaf tissue often sessile.

n. Some hairs on costae and leaf tissue below anchor-shaped, i.e., with 2 short recurved branches at tip .... 31. *T. biolleyi*

nn. Anchor-shaped hairs absent below .... 34. *T. hatchii*

ll. Costae, veins, and leaf tissue glabrous or with unbranched hairs below.

o. Pinnae shorter than 7 cm, often shorter than 5 cm; indusia absent; without rachis buds .... 32. *T. blanda*

oo. Pinnae usually longer than 7 cm; indusia present, but small; rachis buds present or absent.

p. Indusia densely short-pubescent; rachis buds absent; fronds subdimorphic, the fertile contracted and taller than the sterile; leaf tissue not verruculose .... 38. *T. munchii*

pp. Indusia short-ciliate on margin; rachis buds often present; fronds monomorphic; leaf tissue verruculose below .... 44. *T. resiliens*

31. **Thelypteris biolleyi** (Christ) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:58. 1953.

—*Aspidium biolleyi* Christ *in* Pittier, Prim. Fl. Costaric. 3:31. 1901. —*Dryopteris nephrodioides* (Klotzsch) Hieron. var. *biolleyi* (Christ) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:248. 1913. —TYPE: Costa Rica, "Tuis près Turrialba," *Pittier 11243* (presumably P; isotype US).

ILLUSTRATION: none.

Rhizome short-creeping to suberect; stipe to 50 cm or more long, brownish, stellate-pubescent; lamina to 75 cm long with a pinnatifid apex; pinnae to 22 (28) cm long, 2.5–3.0 (4) cm broad, sessile or short-stalked to 1 mm, incised ca. 0.5–0.7 their width, lower pinnae narrowed at their subcuneate base; segments suboblique, subfalcate, rounded at apex, ca. 6 mm broad; veins up to 16 pairs per segment, lowermost pair from adjacent segments anastomosing at a 60–90° angle, with an excurrent vein; costae, costules and leaf tissue below with numerous anchor-shaped hairs 0.2–0.5 mm long (2 recurved branches at tip), also with a few sessile, appressed stellate hairs (4 arms), these especially evident along excurrent veins; axes above with mostly acicular hairs 0.2–0.5 mm long, leaf tissue above with numerous appressed stellate hairs; leaf tissue dark green, herbaceous, verruculose; sori inframedial to medial, exindusiate or with a minute indusium; sporangia glabrous or with a few minute stellate hairs; $n = 36$ (Jam.).

Shaded moist slopes in Lower Montane and Montane rain forests; scattered and uncommon in Northern and Eastern highlands, s Pacific Coastal Plain; 450–800 m. Southern Mex. (Oax.), Guat., Nic., C.R., Pan.; S.A. (Col. to Peru, Braz.); Jam. CHIAPAS COLLECTIONS: *P 7256* (UC, US); *Fi 35395* (F, US); *EM 17959* (F, MEXU, US); *32861, 32990.*

Closely related to *T. nephrodioides* (Klotzsch) Proctor from the Antilles and South America, differing in the presence of anchor-shaped hairs on the rachis, costae, and leaf tissue, and in the united lowermost pair of veins (connivent at the sinus in *T. nephrodioides*).

32. **Thelypteris blanda** (Fée) Reed, Phytologia 17:264. 1968.

—*Phegopteris blanda* Fée, Mém. Fam. Foug. 8:91. 1857. —*Dryopteris blanda* (Fée) C. Chr., Ind. Fil. 254. 1905. —TYPE: Mexico, Veracruz, Mirador, *Schaffner 222* (presumably P, not found; isotype K!).

Phegopteris caespitosa Fourn., Mex. Pl. 1:89. 1872. —*Dryopteris caespitosa* (Fourn.) C. Chr., Ind. Fil. 256. 1905. —TYPE: Mexico, Veracruz, Cordova, *Bourgeau 2005* (P! isotypes C, GH! MO! NY! P! US!).

ILLUSTRATIONS: **Fig. 79**; Christensen (1907:134).

Rhizome erect to suberect; stipe 15–20 (25) cm long, ca. 1 mm diam., stramineous or darkened, glabrous; rachis with a few stellate hairs ca. 0.1 mm long, glabrescent, without buds; lamina pinnate-pinnatifid, ovate-lanceolate, 12–25 cm long, 7–10 (15) cm broad, gradually reduced to a pinnatifid apex; pinnae 7–12 pairs, sessile, to 7.5 cm long, 1.5 (2.0) cm broad, lowermost pair somewhat shortened and deflexed, incised to within 1 mm of costa; segments 7–15 pairs per pinna, oblique, obtuse or acutish at apex; veins 5–6 pairs per segment, reaching margin above sinus; costae on both sides sparsely pubescent by acicular hairs 0.2–0.4 mm long; leaf tissue herbaceous, thin, dark green, glabrous, not verruculose; sori inframedial to medial, exindusiate; sporangia glabrous; n = 36 (Chis.).

Stream banks, seepages, and moist rocks (limestone) in Tropical, Lower Montane, and Montane rain forests; locally common in SE corner of Central Plateau, Eastern and Northern highlands; 300–1300 m. Southern Mex. (Hgo., Ver., Oax.), Guat., C.R. Chiapas Collections: *G 428* (GH, K); *28824*; *31491*; *32282*; *32860*; *32991*; *33098*; *33359*; *34196*; *34493*; *35235*; *38956*; *38989b*.

33. **Thelypteris ghiesbreghtii** (Hook.) Morton, Contr. U.S. Natl. Herb. 38:45. 1967 (which see for additional synonymy).

—*Polypodium crenatum* Swartz var. *ghiesbreghtii* Hook., Sp. Fil. 5:3. 1864. —*Dryopteris ghiesbreghtii* (Hook.) C. Chr., Ind. Fil. 267. 1905. —Type: Mexico, Tabasco, *Linden 1499* (K, frag. US!; isotypes B, BR! P!).

Goniopteris mollis Fée, Gen. Fil. 252. 1852. —*Dryopteris mollis* (Fée) Maxon, Contr. U.S. Natl. Herb. 13:18. 1909; not *D. mollis* (Jacq.) Hieron., 1907; not *Thelypteris mollis* (Mett.) Tryon, 1967. —Type: Mexico, Tabasco, *Linden 1499* (presumably P, not found; isotypes B, BR! K, P!).

Illustrations: Fée, Mém. Fam. Foug. 11: pl. 24, fig. 1. 1866; Hooker, Fil. Exot. pl. 84. 1859 (as *Polypodium crenatum*; lobed more deeply than usual).

Rhizome creeping; stipe 30–40 cm long, scaleless or sparingly scaly; lamina (15) 30–50 cm long, to 30 cm broad, simply pinnate; pinnae 2–5 sessile lateral pairs and a conform terminal one, 20–30 cm long, 4.5–8 cm broad, elliptic, with an acuminate tip, subentire to irregularly serrulate or lobed, without buds in axils; veins 10–12 pairs, 7–12 pairs meniscioid, uppermost pairs anastomosing at obtuse angles; leaf tissue and veins densely soft-hairy beneath, the hairs to 1.5 mm long, often ca. 1.0 mm long, furcate and stellate hairs apparently lacking throughout; sori in a double row between costules, exindusiate or with very small indusial fragment; sporangia glabrous but intermixed with long hairs from receptacle; n = 36 (Chis., C.R.).

Often in cleared understory of forests, as in coffee and cacao plantations, also Lower Montane and Montane rain forests; locally common in Northern Highlands; 500–1000 m. Southern Mex. (Tab.), Guat. to Pan. Chiapas Collections: *P 6763* (UC); *20287*; *20751*; *21615*; *22449*; *28129*; *30783*; *31255*; *32836*; *38330*; *38682*.

This is one of a very few species of subg. *Goniopteris* that apparently lacks stellate or forked hairs. However, on the basis of other characters and its obvious affinities to *T. poiteana,* it is clearly a member of the subgenus.

34. **Thelypteris hatchii** A. R. Smith, Amer. Fern J. 63:118, figs. 1–3. 1973.

—Type: Guatemala, Alta Verapaz, Senahu, Cerro Sillab, *Hatch & Wilson 159* (US—2 sheets).

Illustration: only the original.

Rhizome erect or suberect; stipe brownish, 20–45 cm long, puberulous, the hairs stellate, ca. 0.1 mm long; lamina dark green, 30–50 cm long, with a hastate terminal segment; pinnae 9–14 pairs, sessile or the lowermost with a stalk less than 1 mm; largest pinnae to 20 cm long, 2.7 cm wide, incised ca. 0.5–0.6; lowermost 2–3 pairs of pinnae reflexed and slightly narrowed towards their base, slightly shortened; segments suboblique, subfalcate, ca. 5 mm broad, rounded at tip; veins 9–12 pairs per segment, basal pair from adjacent segments connivent at the sinus or anastomosing at an acute angle below the sinus; rachis, costae, veins, and leaf tissue with stellate or furcate hairs 0.1–0.2 mm long, these densest along costae and rachis, a few longer acicular hairs also present, especially along veins and costae above; sori medial to supramedial, with small but persistent indusia; indusia with simple or furcate hairs 0.1 mm long; sporangia glabrous; n = 36 (Oax.).

Known from Chiapas by two collections, one without specific locality or habitat data, the other from Montane Rain Forest; Sierra Madre; ca. 1300 m. Southern Mex. (Oax., Ver.), Guat. (Alta Verapaz); C.R. Chiapas Collections: *GM 45* (DS); *40138*.

35. **Thelypteris imbricata** (Liebm.) Reed, Phytologia 17:284. 1968.

—*Polypodium imbricatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:210. 1849. —Type: Mexico, Veracruz, Papantla, *Liebmann s.n.* [Fl. Mex. 170, Liebm. Pl. Mex. 2414] (C!).

Illustration: none.

With the characters of *T. tetragona* but differing from that species in having the lowermost pair of veins from adjacent segments connivent at the sinus, or sometimes arcuately and acutely united just below the sinus; sporangia glabrous or setose; spores relatively small, ca. 25–40 μm long (perispore excluded); apparently diploid, n = 36 (Oax.).

Along streams, on wooded slopes, and in cafetals, Seasonal Evergreen Forest, Tropical, Lower Montane, and Montane rain forests; common in Northern Highlands, Sierra Madre, and S Pacific Coastal Plain; 300–800 (2000) m. Tropical Mex. (Ver., Oax., Tab., Gro., Jal., Cma.); Guat., C.R. Chiapas Collections: *M&M 957* (WIS, UC); *G 379* (YU); *13560*; *22455*; *22515*; *22528*; *26531*; *26555*; *27126*; *27458*; *28130*; *31582*; *31594*; *32555*; *32567*; *32863*; *34898*; *34974*; *34995*; *38234*; *38675*; *41619*; *42647*; *42653*.

Christensen (1913:260) treated *Polypodium imbricatum* Liebm. as a synonym of typical *Dryopteris tetragona*. The Liebmann type is a very poor specimen—a single sterile leaf with veins connivent at the sinus. On the basis of venation, I think it is most likely the same as Christensen's *D. tetragona* var. 2 (1913:262), which he considered probably distinct from *D. tetragona*. Both *T. tetragona* and *T. imbricata* can be expected in the vicinity of the type locality of *Polypodium imbricatum*.

Even when good specimens are at hand, it is not always easy to separate *T. imbricata* from *T. tetragona,* although most specimens can be readily placed. The most reliable characters for separating the two are given in the key (couplet i); in addition, there is the indication that *T. imbricata* is diploid (small spores, n = 36) while *T. tetragona* is tetraploid (larger spores, n = 72). Throughout most of southern Mexico, *T. imbricata* seems to be more common; this is certainly true in Oaxaca and the Northern Highlands of Chiapas. Specimens collected from the Pacific Coastal Plain and Sierra Madre in Chiapas are all atypical in that they have setose sporangia (*22515*; *22528*; *31582*; *31594*; *41619*; *42647*; *42653*); they also have broader pinnae and acutish segments. Tentatively, I place them here. Two collections from the Northern Highlands also have sparingly setose sporangia and thus approach *T. tetragona*. The whole problem requires more detailed cytotaxonomic investigation to clarify relationships. *Thelypteris toganetra, T. nicaraguensis,* and *T. minor* are also members of this complex and must be included in any comprehensive study of relationships.

36. **Thelypteris meniscioides** (Liebm.) Reed, Phytologia 17:292. 1968.

—*Polypodium meniscioides* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:211. 1849. —*Dryopteris meniscioides* (Liebm.) C. Chr., Ind. Fil. 277. 1905, non *D. meniscioides* (Willd.) O. Ktze., 1891. —*Dryopteris liebmannii* Maxon & Morton, Bull. Torrey Bot. Club 65:348. 1938. —LECTOTYPE (chosen by Christensen, 1913:266): Mexico, Oaxaca, Teotalcingo, *Liebmann* [Fl. Mex. 171, Liebm. Pl. Mex. 2407] (C!).
ILLUSTRATION: Rovirosa, Pterid. Sur Mex. pl. 41. 1909.

Rhizome short-creeping; stipe 30–60 cm long, glabrous; lamina 25–35 cm long, nearly as broad; pinnae (3) 4–12 lateral pairs and a conform terminal one, narrowed on both sides of middle, 15–20 cm long, 3.5–5.0 cm broad, the margin entire, crenate, or very shallowly lobed, long-acuminate at tip; costules ca. 4–5 mm apart, with 8–10 pairs of veins, these meniscioid; costae, veins, and leaf tissue glabrous or nearly so above and below, or with a few minute furcate hairs (0.1 mm long) toward bases of costae below; leaf tissue chartaceous to subcoriaceous; sori in double rows between costules, exindusiate; sporangia glabrous, rarely minutely setulose, the setae less than 0.1 mm long; $n = 36$ (Oax., Chis.).

In Tropical, Lower Montane, and Montane rain forests; locally common in Northern and Eastern highlands; 300–1250 m. Southern Mex. (Ver., Oax., Tab.), Guat. A report by Reed (Phytologia 17:292. 1968) that this species occurs in Panama and Guadeloupe is incorrect. CHIAPAS COLLECTIONS: *GM 149* (DS, US); *EM 3603* (GH, MEXU, MICH, NY, US); *21611*; *21839*; *26571*; *32859*; *33002*; *34131*; *34973*; *36661*; *38681*; *38714*.

As Christensen (1913) and others have pointed out, *T. meniscioides* is perhaps the closest link between subg. *Goniopteris* and subg. *Meniscium*.

37. **Thelypteris minor** (C. Chr.) A. R. Smith, Phytologia 34:232. 1976.

—*Dryopteris nicaraguensis* (Fourn.) C. Chr. var. *minor* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:252. 1913. —LECTOTYPE (chosen by Smith, loc. cit.): Guatemala, Alta Verapaz, Secanquin, *Maxon & Hay 3196* (US).
ILLUSTRATION: none.

Rhizome suberect to erect, caudex 1.5–2 cm diam., to 10 cm long; fronds mostly 60–80 cm long, with stipe brownish, 2–4 mm wide, as long as or slightly longer than blade; pinnae 8–10 pairs (with a nearly conform terminal pinna), 12–16 (20) cm long, 2.0–2.8 cm broad, incised 0.5–0.6 (0.7) to costa, all but the uppermost several pairs stalked 1–3 mm; segments oblique, subfalcate, 4–6 mm broad, acutish to obtuse at tip, basal 1–3 pairs on lowermost 3–5 pairs of pinnae rather abruptly shortened (to a sinuate wing on lowermost 1–2 pairs of pinnae); veins 10–12 (15) pairs per segment, lowermost 2 pairs connivent at sinus or (less frequently) united at an acute angle below sinus; costae below with scattered to dense hairs 0.1 mm long, these mostly acicular but a few furcate; leaf tissue dark green, chartaceous, glabrous on both sides; sori inframedial; sporangia usually setulose, with hairs 0.1 mm long, occasionally glabrous (ours); exindusiate.

In Lower Montane Rain Forest; rare in Eastern Highlands near Guatemala border; 800 m. Southern Mex. (Chis. only), Guat., Salv., C.R. CHIAPAS COLLECTIONS: *41979*; *42002*?

In addition to the differences in the key, *T. minor* differs from *T. imbricata* in having the veins below more prominent and raised, the segments more falcate and acute at the tip, and the blades a darker green.

Breedlove 42003 seems to have abortive spores and sporangia and may be a hybrid involving *T. minor*.

38. **Thelypteris munchii** A. R. Smith, Amer. Fern J. 63:120, figs. 9–10. 1973.

—TYPE: Mexico, Chiapas, *Münch s.n.* (DS).
ILLUSTRATION: only the original.

Rhizome erect or suberect, apex clothed with castaneous glabrous scales; fronds subdimorphic, the stipe brownish, fertile stipes ca. 30 cm long, sterile about 15–20 cm long, puberulous by stellate hairs ca. 0.1 mm long, glabrescent; fertile lamina ovate-lanceolate, ca. 25 cm long, 10 cm wide, pinnate-pinnatifid (apex unknown, probably pinnatifid), sterile lamina ovate, ca. 30 cm long, 10 cm wide; pinnae sessile, lowermost arcuate, 3–4 lowermost pairs reflexed, fertile pinnae ca. 1.0 (1.2) cm wide, incised ca. 0.8 their width, sterile pinnae to 2.3 cm wide, incised ca. 0.8–0.9 their width; basal basiscopic segment of lowermost pinnae reduced, acroscopic not reduced; costae above pilose, below pilose with hairs mostly simple, ca. 0.1 mm long; costules, veins, and leaf tissue above glabrous, below pilose on fertile fronds, glabrous on sterile fronds; veins simple, on fertile pinnae up to 7 pairs per segment, on sterile pinnae up to 10 pairs, lowermost reaching margin at or just above sinus, not connivent; sori medial, with a densely pilose indusium, the hairs ca. 0.1 mm long; sporangia glabrous.

Known only from the type collection, without precise locality or habitat data.

39. **Thelypteris nicaraguensis** (Fourn.) Morton, Contr. U.S. Natl. Herb. 38:55. 1967.

—*Phegopteris nicaraguensis* Fourn., Bull. Soc. Bot. France 19:252. 1872. —*Dryopteris nicaraguensis* (Fourn.) C. Chr., Ind. Fil. 279. 1905. —TYPE: Nicaragua, Chontales, *Lévy 460bis* (P; fragment BM, photo UC! isotype P!).
ILLUSTRATION: Christensen (1913:251).

Rhizome short-creeping to suberect; stipe tan to brownish, to 80 cm long, 3–5 mm diam.; lamina 30–50 cm long with 4–8 (10) pairs of lateral pinnae and a conform terminal one; pinnae 11–20 (24) cm long, 2.5–4 cm broad, lowermost stalkèd to 2 mm, incised ca. 0.5 their width; segments falcate, rounded to subacute, entire, 6–8 mm broad, basal ones of lower pinnae gradually reduced; veins (8) 12–18 pairs, lowermost 2–3 pairs connivent to sinus; costae below with mostly minute acicular hairs 0.1 mm long, glabrescent; leaf tissue on both sides glabrous, chartaceous, not verruculose; sori inframedial, exindusiate; sporangia glabrous or minutely setulose.

Along stream banks in Montane Rain Forest, Pine-Oak-Liquidambar Forest; rare in SE corner of Central Plateau (Lagos de Monte Bello); 1300 m. Nic., C.R., Pan. CHIAPAS COLLECTION: *22378*.

This is a common species in the southern portion of its range, but apparently heretofore unknown north of Nicaragua. Our collection is very atypical in its rather densely acicular-hairy stipe base and rhizome apex scales (densely stellate-hairy in typical *T. nicaraguensis*). The Chiapas specimen may represent an undescribed species, but more material is needed as well as monographic study of the entire *T. tetragona-nicaraguensis* complex.

40. **Thelypteris obliterata** (Swartz) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:62. 1953.

—*Polypodium obliteratum* Swartz, Prodr. Veg. Ind. Occ. 132. 1788. —*Dryopteris obliterata* (Swartz) C. Chr., Ind. Fil. 280. 1905. —Type: Jamaica, *Swartz s.n.* (S; possible isotype B—Herb. Willd. 19680).

Polypodium faucium Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:209. 1849. —Type: Mexico, Veracruz, "Baranca de la Hacienda de Jovo, pr. Sta. Maria Tlapango" (specimen), *Liebmann s.n.* [Fl. Mex. nos. 169, 735, 736; all Liebm. Pl. Mex. 2416] (C!); I choose no. 736 as lectotype.

Illustration: Hooker's Icon. Plant. 17:pl. 1669. 1886.

Rhizome short-creeping; stipe (32) 40–50 cm long, stramineous to tan, ± glabrous; rachis pubescent with stellate hairs ca. 0.1 mm long, without buds; lamina pinnate, to 50 cm long, 40 cm broad, with a conform terminal pinna; pinnae (4) 5–10 pairs, stalked to 5 mm, alternate, 12–20 cm long, (1.3) 2–3.5 cm broad, sharply serrate (the teeth oblique, acute) or shallowly lobed up to ⅓ their width, lower pinnae narrowed towards their entire cuneate or rounded base; veins 6–8 (11) pairs, lower 2 pairs anastomosing with an excurrent branch to the sinus, to which the next 2–3 pairs of veins are connivent; costae below puberulous with simple (a few stellate) hairs 0.1 mm long; leaf tissue above and below glabrous, chartaceous to subcoriaceous; sori exindusiate, in 2 convergent rows, lower ones medial, upper ones subcostular; sporangia with a few simple setae 0.1 mm long; $2n$ = ca. 108, with II and I at first metaphase (Jam.).

In Tropical and Montane rain forests, Seasonal Evergreen Forest; uncommon in Eastern and Northern highlands (not Jitotol Ridge), E portion of Central Plateau; 300–900 m. Southern Mex. (Ver.), Bel., Guat., Hond., Nic., C.R.; Cuba, Jam., Hisp. Chiapas Collections: *21838*; *27977*; *33030*; *33368*; *34132*.

Walker (Trans. Roy. Soc. Edinburgh 66:215. 1966) believed that this species might be apogamous.

41. **Thelypteris paucipinnata** (Donn.-Smith) Reed, Phytologia 17:302. 1968.

—*Nephrodium fendleri* (D. C. Eaton) Hook. var. *paucipinnatum* Donn.-Smith, Bot. Gaz. (Crawfordsville) 12:134. 1887. —*Dryopteris paucipinnata* (Donn.-Smith) Maxon, Contr. U.S. Natl. Herb. 13:19. 1909. —Lectotype (chosen by Maxon, op. cit.:20): Guatemala, Alta Verapaz, Petet, *von Tuerckheim s.n.* (ed. Donn.-Smith 767) (US 828957! isolectotypes UC! US!).

Illustration: none.

Rhizome creeping to suberect; stipe darkened, ca. (35) 65 cm long, glabrous except for a few deciduous basal scales; rachis usually with buds in axils of upper pinnae; lamina 45–50 cm long, ca. 25 cm broad, with (3) 5–8 (10) pairs of lateral pinnae and a conform terminal one, all about the same size; pinnae (17) 20–25 cm long, ca. 3 (4) cm broad at the middle, falcate, obliquely pinnatifid ca. ⅓ their width, tapering gradually to a narrow, entire, long-acuminate apex, base narrowly cuneate, stalked up to 8 mm; veins ca. 10–14 pairs per segment, 4–6 lowermost pairs from adjacent segments connivent at sinus, occasionally the lowest pairs united below sinus; leaf tissue chartaceous to subcoriaceous, verruculose below; sori submarginal; indusia whitish, reniform, persistent; sporangia glabrous.

Stream banks and ravines in Tropical and Montane rain forests, Pine-Oak-Liquidambar Forest; locally common in vicinity of Lagos de Monte Bello, scattered in E edge of Northern Highlands and Central Plateau; 300–1300 (1600) m. Southern Mex. (Ver., Oax.), Bel., Guat. Chiapas Collections: *MC 2121* (US); *13032*; *22333*; *26533*; *27912*; *32160*; *35224*; *35340*; *38786*; *42090*.

42. **Thelypteris poiteana** (Bory) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:63. 1953.

—*Lastrea poiteana* Bory, Dict. Class. 9:233. 1825. —*Dryopteris poiteana* (Bory) Urban, Symb. Ant. 4:20. 1903. —*Goniopteris poiteana* (Bory) Ching, Sunyatsenia 5:239. 1940. —Type: "Guíane," communiquée par Poíteau (presumably P, not found).

Polypodium crenatum Swartz, Prodr. Veg. Ind. Occ. 132. 1788, non Forssk. (1775) —Type: Jamaica, *Swartz s.n.* (S).

Illustrations: Fée, Mém. Fam. Foug. 11:pl. 18, fig. 2. 1866 (as *Goniopteris rivoirei* Fée); Rivière, Fougères 2:18, pl. 3. 1868.

Rhizome short-creeping, ca. 1 cm diam.; fronds few, 0.5–1 m long; stipe glabrescent; lamina 20–40 cm long, 18–30 cm broad, 1-pinnate; pinnae 2–6 lateral pairs and a conform terminal one, 12–22 cm long, 3–6 cm broad, subentire or crenate or coarsely serrate, rarely shallowly lobed, sometimes gemmiparous in axil; basal pinnae mostly short-stalked, subcuneate at the base, those above sessile and rounded; costules 4–8 mm apart; veins meniscioid, with 6–9 pairs of secondary veins, lower 3–5 pairs upcurved and acutely united with a free excurrent veinlet, usually the next few pairs alternately united in a common veinlet running to sinus; costae, veins, and leaf tissue on both sides pilose, hairs mostly acicular, ca. 0.3–0.5 (1.0) mm long; sori in a double row between costules, exindusiate; sporangia with 4–6 acicular setae 0.1–0.3 mm long; n = 72 (Jam., Oax.).

In cafetals, Seasonal Evergreen Forest, Tropical Rain Forest; uncommon in Eastern Highlands, S Pacific Coastal Plain; 200–400 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Peru, Gui., N Braz.); Antill., Trin. Chiapas Collections: *22530*; *33367*; *33980*; *34537*.

Common over much of its range, especially the Antilles, but rather uncommon in Mexico.

43. **Thelypteris reptans** (J. F. Gmel.) Morton, Fieldiana, Bot. 28:12. 1951.

—*Polypodium reptans* J. F. Gmel., Syst. Nat. 2:1309. 1791. —*Dryopteris reptans* (J. F. Gmel.) C. Chr., Ind. Fil. 288. 1905. —Type: Jamaica, *Swartz s.n.* (S).

Dryopteris radicans sensu Maxon, Contr. U.S. Natl. Herb. 10:490. 1908.

Illustration: Small, Ferns SE States 218. 1938.

Rhizome small, decumbent to suberect; fronds usually numerous, laxly arching or procumbent, subdimorphic, the sterile often rooting at the attenuate tip or along rachis, (10) 15–50 (90) cm long, fertile more erect and longer stalked, not rooting at tip; lamina mostly 10–30 cm long, 3–5 (10) cm broad, pinnate in lower half or throughout; pinnae stalked ca. 1 mm or sessile, entire to crenate to shallowly lobed ca. ⅓ their width, linear to oblong or oval, truncate or sometimes subcordate at base (fertile pinnae usually entire and more linear than sterile ones); veins 2–5 (7) pairs, basal pair usually united, with an excurrent branch to sinus, or veins free; costae, veins, and leaf tissue minutely stellate-pubescent or furcate-hairy on both sides, also with simple hairs; indusia absent or very small, bearing a few long simple hairs and/or forked hairs; sporangia deciduously stellate-hairy; $n = 36$ (Jam.), 72 (Fla.).

On limestone rock faces, in Tropical and Montane rain forests; uncommon in Northern and Eastern highlands; 200–1350 m. Southern Mex. (Ver., Oax., Yuc.), Guat.; S.A. (Ven.); Fla., Antill., Bah. Is. Chiapas Collections: *Dr 1616* (MEXU, GH); *21558*; *32948*; *33896*; *35347*.

Christensen (1913) recognized four varieties of *Dryopteris reptans,* but these seem only weakly distinguishable and are possibly only growth forms. Material from Mexico and Guatemala is as uniform as can be expected considering that leaves of a single plant are often extremely polymorphic.

44. **Thelypteris resiliens** (Maxon) A. R. Smith, Amer. Fern J. 63:121. 1973.

—*Dryopteris resiliens* Maxon, Field Mus. Nat. Hist., Bot. Ser. 17:302. 1938. —Type: Honduras, Dept. Atlantida, Lancetilla Valley near Tela, *Standley 52893* (US).
Illustration: none.

Rhizome creeping to suberect, ca. 1 cm diam.; rhizome scales few, 3–5 mm long, tan, glabrous; fronds subfasciculate, 40–70 cm long, stipe about as long as blade, stramineous, stellate-hairy; lamina pinnate-pinnatifid, 20–35 cm long, 12–20 cm broad, lanceolate to ovate-lanceolate, gradually reduced toward the pinnatifid apex; pinnae 15–19 pairs, sessile, 2–3 lowermost pairs deflexed, these the largest, 8–12 cm long, 1.4–3 cm broad, pinnatifid ca. 0.7 to costae; ultimate segments oblique, subfalcate, 4–5 mm between costules, acutish at apex; one or more upper pinnae viviparous at base; veins 10–13 pairs, basal pair running out nearly or quite to sinus, but not connivent; costae and costules puberulous below, hairs mostly simple (a few stellate), ca. 0.1 mm long; leaf tissue herbaceous, verruculose throughout, glabrous; sori medial; indusia small, tan, ciliolate, persistent; sporangia glabrous.

Along streams and on limestone rocks, in Seasonal Evergreen Forest, Lower Montane Rain Forest; uncommon in Northern Highlands; 500–1200 m. Known only from Chis., Guat., and Hond. Chiapas Collections: *R 51* (US); *R&R&M 907, 1397* (MICH, US); *31235*; *32862*; *34886*.

45. **Thelypteris stolzeana** A. R. Smith, Phytologia 34:231. 1976.

—Type: Guatemala, Alta Verapaz, between Cobán and San Pedro Carchá along Río Carchá, *Standley 90107* (F!).
Illustration: none.

Rhizome erect, caudex ca. 1.0–1.5 cm diam.; stipe brownish, 10–20 cm long, 1–2 mm diam., with 2–3-cleft and a few simple hairs ca. 0.1 (0.2) mm long, glabrescent; lamina dark gray-green, 15–25 cm long, gradually reduced distally to a confluent, pinnatifid, somewhat elongate apex; rachis without buds; pinnae 8–9 pairs, sessile; largest pinnae to ca. 5 cm long, 1.5 cm broad, incised ca. 0.5–0.7; lowermost 1–2 pairs of pinnae slightly reduced and deflexed, narrowed at their base; segments suboblique, not or only obscurely falcate, 2–3 mm broad, rounded to truncate at tip; veins 4–6 pairs per segment, basal pair from adjacent segments meeting margin within 0.3 mm of sinus; rachises and costae below with mostly 2–4-cleft (some simple), stalked hairs mostly 0.1 (0.2) mm long; veins below with mostly short, simple hairs; leaf tissue chartaceous, on both sides glabrous, not verruculose; sori inframedial to medial, lacking indusia; sporangia glabrous.

Along river bank, Montane Rain Forest, Pine-Oak-Liquidambar Forest; rare in se Central Plateau; 1300 m. Known from a single Chiapas collection and the type from Guatemala. Chiapas Collection: *22355*.

46. **Thelypteris tetragona** (Swartz) Small, Ferns SE States 256. 1938.

—*Polypodium tetragonum* Swartz, Prodr. Veg. Ind. Occ. 132. 1788. —*Dryopteris tetragona* (Swartz) Urban, Symb. Ant. 4:20. 1903. —Type: Jamaica, *Swartz s.n.* (S–PA).
Illustration: Small, Ferns SE States 257. 1938.

Rhizome short-creeping, caudex ca. 1 cm diam.; fronds subdimorphic, fertile ones erect, to 1 m long, long-stipitate, sterile ones shorter, arching; stipe stramineous to tan, to 60 cm long, 2–5 mm diam., stellate-pubescent; rachis without buds; lamina pinnate-pinnatifid with a conform terminal pinna, 30–45 (55) cm long, 12–25 (30) cm broad; pinnae 6–10 (12) pairs, subopposite, sessile to stalked 1 mm, lowermost somewhat narrowed at base, 7–15 (18) cm long; sterile pinnae mostly 2–3 cm broad, fertile ones 1–2 cm broad, pinnatifid 0.5–0.7 their width; segments oblique, subfalcate, rounded at apex, ca. 4 mm broad; veins 6–10 pairs, basal pair united at an obtuse angle with an excurrent vein to sinus; costae on both sides with mainly acicular hairs 0.1–0.3 mm long; leaf tissue herbaceous, glabrous, not verruculose; sori inframedial, exindusiate; sporangia with simple setae 0.1 mm long; $n = 72$ (Fla., Jam., Ver., Chis.).

Stream banks and shaded ravines in Tropical Rain Forest, Tropical Deciduous Forest, Seasonal Evergreen Forest, Lower Montane Rain Forest; uncommon in Eastern and Northern highlands (not Jitotol Ridge), Central Depression, n Sierra Madre; 300–1000 m. Southern and e Mex. (Sin.?, Tam., Hgo., S.L.P., Ver., Yuc., Tab., Camp., Oax.), Bel., Guat., Nic., C.R.; S.A. (to Ecu., Sur.); Antill., Trin., Fla. Chiapas Collections: *R 51* (NY, PH); *21613*; *21641*; *25234*; *30782*; *33272*; *34209*; *39997*; *42847*.

47. **Thelypteris toganetra** A. R. Smith, Amer. Fern J. 63:118. 1973.

—Type: Mexico, Veracruz, Atoyac River, *Copeland Herbarium no. 34* (UC! isotypes GH! MICH! US!).
Illustration: none.

Rhizome long-creeping to suberect; fronds to 70 cm long, 30 cm broad, with a conform terminal pinna; stipe and rachis on both sides glabrous, or above with a few stellate hairs less than 0.1 mm long; pinnae 10–16 pairs, incised 0.5–0.7 their width, sessile, lowermost pinnae narrowed but still lobed at base; segments subfalcate, acute at apex; costae on both sides glabrous or above with a few simple hairs ca. 0.2 mm long; costules, veins, and leaf tissue on both sides glabrous, but frequently with scattered, sessile, reddish glands along costules and veins below; veins 8–15 pairs, 1–2 lowermost pairs connivent at sinus, not truly united; sori medial, exindusiate; sporangia glabrous; $n = 36$ (Chis.).

Wet banks, often calcicolous, in Tropical and Montane rain forests, Pine-Oak-Liquidambar Forest; uncommon in Eastern Highlands, se Central Plateau; 300–1300 m. Southern Mex. (S.L.P., Ver., Oax.), Bel., Guat. Chiapas Collections: *B&S s.n.* (UC); *22340*; *27578*; *33340*; *33979*; *34223*.

Most collections of this species have been made from large, mostly sterile colonies. Plants of *T. toganetra* have the habit and texture of *T. tetragona* but differ by the characters given in the key (couplet h).

Thelypteris subg. **Macrothelypteris** (H. Ito) A. R. Smith, Phytologia 34:233. 1976.

—*Thelypteris* sect. *Macrothelypteris* H. Ito *in* Nakai & Honda, Nov. Fl. Jap. no. 4. 141. 1939. —*Macrothelypteris* (H. Ito) Ching, Acta Phytotax. Sin. 8:308. 1963. —TYPE: *Polystichum torresianum* Gaud. [≡*Thelypteris torresiana* (Gaud.) Alston].

Caudex short, creeping or suberect; fronds bipinnate to bipinnate-pinnatifid with ± adnate pinnules; scales on rachis often with thickened bases, sometimes with marginal hairs, always with an acicular hair-tip; veins usually branched, not reaching margin; hairs on fronds acicular and capitate, some long-septate hairs always present; sori small, usually with a small indusium; sporangia usually with small capitate hairs near annulus; spores with a ± winged perispore; $x = 31$.

Nine species, Old World tropics and subtropics, from Mascarene Islands to Queensland and Hawaii; a single species naturalized in various parts of the New World tropics and subtropics.

48. **Thelypteris torresiana** (Gaud.) Alston, Lilloa 30:111. 1960.

—*Polystichum torresianum* Gaud. *in* Freyc., Voy. Bot. 333. 1828. —*Macrothelypteris torresiana* (Gaud.) Ching, Acta Phytotax. Sin. 8:310. 1963. —TYPE: Mariana Isl., *Gaudichaud s.n.* (P).

Aspidium uliginosum Kunze, Linnaea 20:6. 1847. —*Dryopteris uliginosa* (Kunze) C. Chr., Ind. Fil. Suppl. III. 100. 1934. —*Thelypteris uliginosa* (Kunze) Ching, Bull. Fan Mem. Inst. Biol., Bot. 6:342. 1936. —LECTOTYPE (chosen by Morton, Contr. U.S. Natl. Herb. 38:219. 1973): cult. Hort. Bot. Leipzig, origin Java (BR, photo US).

ILLUSTRATIONS: Wherry, Southern Fern Guide 105. 1964; Proctor, Fl. L. Antill. 2:271. 1977.

Caudex short-creeping, stout; stipe to 50 cm long, glaucous when living, stramineous when dry, base with many narrow, dark brown, hairy scales, rest of stipe glabrous or glabrescent; lamina to ca. 70 cm long, 50 cm broad, deeply bipinnate-pinnatifid, with 12–15 pairs of free pinnae, subbasal ones longest; largest pinnae to ca. 20 × 9 cm, deltoid, pinnate with all pinnules but the lowest ± adnate to a narrowly green-winged costa; pinnules distinctly oblique to costae, lowest ones of basal pinnae reduced but of upper pinnae not so, largest 5–8 × 1.5–2.5 cm, cut almost to the costule into oblique, dentate to deeply lobed segments 2.5–4.0 mm wide; costae and costules beneath clothed with scattered, pale, stiff, slender hairs, some multicellular and over 1 mm long; leaf tissue below with short, erect, unicellular, capitate hairs; veins in largest segments 7–12 pairs, forked or pinnate, distal part of each vein thickened; sori round, indusia very small with a few capitate hairs; sporangia each with 2–3 short capitate hairs near annulus; $n = 62, 93$ (O.W.).

Adventive, in Seasonal Evergreen Forest, Pine-Oak Forest, Montane Rain Forest; scattered in Northern and Eastern highlands, Central Plateau, Sierra Madre; 800–1600 m. Southern Mex. (Oax., Ver.), Guat., Hond., C.R.; S.A. (Ven. to Braz. and N Arg.); SE U.S., Jam., St. Vincent, Grenada; native to Males., NE Austral. and Polyn., Mascarene Is., warmer parts of mainland Asia and Jap., Haw. CHIAPAS COLLECTIONS: *23964*; *33094*; *34872*; *42101*.

Thelypteris subg. **Meniscium** (Schreber) Reed, Phytologia 17:254. 1968.

—*Meniscium* Schreber, L. Gen. Pl., ed. 8, 2:757. 1791. —*Dryopteris* subg. *Meniscium* (Schreber) C. Chr., Ind. Fil. xxii. 1906. —*Thelypteris* subg. *Cyclosorus* sect. *Meniscium* (Schreber) Morton, Amer. Fern J. 53:154. 1963. —TYPE: *Polypodium reticulatum* L. [≡*Thelypteris reticulata* (L.) Proctor].

Rhizome creeping, stout, often 1–2 (2.5) cm thick; fronds of most species large, to 2 m long, often subdimorphic; lamina 1-pinnate (simple in 2 spp.) with a terminal, often conform pinna; pinnae entire, or the margin repand, serrate, or uncinate-serrate; venation meniscioid (lateral veins straight and giving rise to numerous, straight, arcuate, or subsigmoid secondary veins that regularly anastomose and produce an excurrent veinlet, thus creating a series of areoles between costa and pinna margin); hairs simple (never stellate), relatively sparse and short, curved, often confined to costae on both sides and main lateral veins below; sori confluent along secondary veins and where they join, exindusiate; sporangia glabrous or with setae arising from the stalks; $x = 36$.

About 23 species, confined to the American tropics and subtropics, from southern Mexico to northern Argentina and Paraguay; Florida, Antilles. Most species occur at elevations below 1500 m, along streams and wet banks.

a. Pinnae uncinate-serrate, at least toward apex; sporangial stalks glabrous .... 50. *T. serrata*
aa. Pinnae entire, occasionally undulate or crenulate; sporangial stalks glabrous or with setae.
  b. Sporangial stalks bearing near apex one or more stiff setae (seen as hairs among sporangia; secondary veins arcuate or subsigmoid .... 51. *T. standleyi*
  bb. Sporangial stalks without hairs; secondary veins nearly straight .... 49. *T. falcata*

49. **Thelypteris falcata** (Liebm.) Tryon, Rhodora 69:6. 1967.

—*Meniscium falcatum* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:183. 1849. —*Dryopteris falcata* (Liebm.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (7)10:270. 1913. —TYPE: Mexico, Oaxaca, Distr. Chinantla, *Liebmann s.n.* [Fl. Mex. nos. 678, 679, 680, 681; all Liebm. Pl. Mex. 2756] (C!). I choose no. 680 as lectotype. Isotypes K! US!

Meniscium jurgensenii Fée, Gen. Fil. 223. 1852. —*Dryopteris jurgensenii* (Fée) Maxon & Morton, Bull. Torrey Bot. Club 65:360. 1938. —TYPE: Mexico, *Jurgensen 917* (presumably P, not found).

ILLUSTRATION: none.

Rhizome short-creeping; fronds mostly 85–125 (200) cm long, 1-pinnate with a ± conform terminal pinna; pinnae 8–12 (20) pairs, ± equal in size, the lower long-stalked (to 1–3 cm), often curved, 15–32 (40) cm long, (1.8) 2–4 (5) cm broad, widest in the middle, tapering on both sides to an acuminate apex and a cuneate base, margin entire to undulate; lateral veins of fertile pinnae ca. 8–12 per 3 cm, the veins meniscioid, forming 6–12 (17) series of areoles that are about as long as broad between costa and pinna margin, secondary veins ± straight and uniting at an obtuse angle, an excurrent vein often dividing areole into two subequal rhomboid halves; costae above and below sparsely hairy (hairs 0.2–0.3 mm long), veins and leaf tissue on both sides glabrous or glabrescent; sori in a single row between costules, at confluence of secondary veins; sporangial stalk without hairs.

Not known from Chiapas but to be expected, especially at lower elevations of the Eastern and perhaps Northern highlands. Southern Mex. (Oax., Pue., Ver.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Bol.); Cuba.

50. **Thelypteris serrata** (Cav.) Alston, Kew Bull. 1932:309. 1932.

—*Meniscium serratum* Cav., Descr. Pl. 548. 1802. —*Dryopteris serrata* (Cav.) C. Chr., Ind. Fil. 291. 1905. —Type: Cuba, Havana, *Joseph Guio* (MA).

Illustrations: Rovirosa, Pterid. Sur Mex. pl. 50, figs. 4–5. 1909; Small, Ferns SE States 216. 1938.

Rhizome short-creeping; fronds to ca. 2 m long or more; lamina 1-pinnate, upper pinnae gradually shortened, with a lanceolate terminal segment; pinnae 15–25 pairs, the lower short-stalked to 4 mm, largest 15–25 cm long, (2) 2.5–3.5 (4.5) cm broad, margin serrate or uncinate-serrate; fertile pinnae often somewhat narrower than sterile ones; veins meniscioid, secondary veins arcuate or subsigmoid, with 10–15 pairs anastomosing and giving rise to short excurrent veinlets, the areoles thus formed much shorter than broad; costae, costules and sometimes veins and leaf tissue below pubescent (hairs ca. 0.2 mm), above glabrous except for sparsely hairy costae; buds occasionally borne at base of costae of lower pinnae; sori along the veins at the anastomoses, confluent, exindusiate; sporangial stalks without hairs; $n = 36$ (Fla.).

Along streams and in swamps, Gulf Coastal Plain, Northern Highlands, s Sierra Madre; ca. 550 m, and probably lower. Southern Mex. (Nay.?, Ver., Tab.), Guat., Hond., Nic., C.R., Pan.; S.A. (to n Arg.); Fla., Antill., Trin. Chiapas Collections: *Fi 35387* (DS, F); *R s.n.* (not seen; cited by Rovirosa, Pterid. Sur Mex. 240. 1909); *G&H 163* (MICH, MSC, US).

51. **Thelypteris standleyi** (Maxon & Morton) Tryon, Rhodora 69:8. 1967.

—*Dryopteris standleyi* Maxon & Morton, Bull. Torrey Bot. Club 65:368. 1938. —Type: Guatemala, Dept. Izabal, near Quiriguá, *Standley 24126* (US).

Illustration: none.

Rhizome short-creeping; fronds to 1.9 m long, with stipe much longer than lamina; lamina 1-pinnate, gradually reduced distally, to 70 cm long, 40 cm broad; pinnae 12–17 lateral pairs with a terminal pinna, margin entire or slightly repand, (10) 12–22 cm long, 2.3–4 cm broad (the fertile often narrower), acute at apex, rounded or subcordate at base, all sessile; venation meniscioid, with 9–13 lateral veins per 3 cm (13–15 on fertile fronds), secondary veins arcuate or subsigmoid, acutely anastomosing to form 9–14 (20) series of areoles, excurrent veinlets free (secondary veins straight and obtusely united in fertile fronds); costae, veins, and sometimes leaf tissue below with curved, rigid hairs 0.2–0.3 mm long, glabrous above except for scattered hairs along costae; sori oblong and confluent where secondary veins anastomose; sporangia bearing rigid solitary setae from sporangial stalk.

Forested ravines; rare in Sierra Madre, to be expected in Eastern Highlands; probably below 1200 m. Southern Mex. (Chis. only), Guat., Hond., Nic., Pan.; S.A. (Col. to Bol.). Chiapas Collection: *S&S 2013* (US).

Thelypteris subg. **Stegnogramma** (Blume) Reed, Phytologia 17:254. 1968.

—*Stegnogramma* Blume, Enum. Pl. Jav. 172. 1828. —Type: *Stegnogramma aspidioides* Blume [no available comb. in *Thelypteris*].

Leptogramma J. Smith, J. Bot. (Hooker) 4:51. 1841. —*Dryopteris* subg. *Leptogramma* (J. Smith) C. Chr., Ind. Fil. xxi. 1906. —Type: *Polypodium tottum* Willd. [=*Thelypteris pozoi* (Lag.) Morton].

Rhizome short-creeping to erect; fronds pinnate, pinnae entire to deeply pinnatifid, basal pinnae not or little reduced; upper pinnae broadly adnate to, and often decurrent on, rachis and merging with apical portion of lamina; rachis, costae, veins, and leaf tissue with acicular (unicellular or septate) hairs; glands lacking; veins free, meeting the margin at the sinus (ours), or anastomosing to form a complex network; aerophores absent; sori exindusiate, running along veins; sporangia usually setiferous; spores finely spinulose; $x = 36$.

About 15 species, all but three confined to the Old World (mostly eastern Asia). *Thelypteris pilosa* is the sole species in North America; two species occur in southern Brazil.

52. **Thelypteris pilosa** (Mart. & Gal.) Crawford, Amer. Fern J. 41:16, pl. 3a. 1951.

—*Gymnogramma pilosa* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):27, pl. 4, fig. 1. 1842. —*Dryopteris pilosa* (Mart. & Gal.) C. Chr., Ind. Fil. 284. 1905. —*Stegnogramma pilosa* (Mart. & Gal.) Iwatsuki, Amer. Fern J. 54:141. 1964. —Syntypes: Mexico, Veracruz, "pic d'Orizaba," *Galeotti 6267, 6268* (BR! isosyntypes P!).

Gymnogramma procurrens Fée, Mém. Fam. Foug. 8:78. 1857. —*Gymnogramma pilosa* var. *major* Fourn., Mex. Pl. 1:73. 1872. —*Thelypteris pilosa* var. *major* (Fourn.) Crawford, Amer. Fern J. 41:19. 1951. —Type: Mexico, Popocatapetl, *Schaffner 293* (presumably P, not found).

Dryopteris pseudo-totta Christ, Bull. Herb. Boissier (2)7:415. 1907. —Type: Mexico, Chiapas, San Cristóbal, *Münch 23* (presumably P, not found).

Illustrations: Knobloch & Correll, Ferns Chih. 168. 1962; also those cited above.

Rhizome short-creeping, ca. 2–5 mm diam.; fronds mostly less than 55 cm long, stipe 0.5–1.0 blade length; pinnae 1–8 (10) cm long, to 1.4 (2.5) cm broad, often broadly adnate and basiscopically decurrent to rachis (especially in upper half of lamina), or lowermost pinnae short-stalked (ca. 1 mm), incised ⅓–⅔ their width; segments oblique, oblong to deltoid, mostly obtuse at tip; veins 3–6 (10)-jugate, the two basal ones from adjacent pinnae running to the sinus; costae, costules, veins, and sometimes leaf tissue on both sides with long stout hairs mostly 0.5–1.5 mm long; sori elongate along veins, mostly 1.5–4.0 mm long, exindusiate; sporangia often minutely setose or glandular on capsule, the setae ca. 0.1 mm long; *n* = 36 (Oax.).

On rocky slopes and limestone ridges, Pine-Oak Forest; rare in Central Plateau; ca. 2700 m. Nearly throughout Mex. (Chih. and Hgo. to Chis.), Guat., Hond.; Ala. CHIAPAS COLLECTIONS: *GM 5* (DS, P); *15108*.

This species varies greatly in size of fronds, depth of cutting of pinnae, degree of adnation and decurrence of the pinnae, density and length of pubescence, and presence or apparent absence of sporangial setae. Crawford (Amer. Fern J. 41:15–20. 1951) and Iwatsuki (Amer. Fern J. 54:141–143. 1964) recognized three varieties, including var. *major* and var. *pilosa* from Chiapas. The two intergrade and occur sympatrically throughout Mexico. Thus, I find no justification for recognition of varieties.

Thelypteris subg. **Steiropteris** (C. Chr.) Iwatsuki, Mem. Coll. Sci. Kyoto Imp. Univ., (B)Biol. 31:31. 1964.

—*Dryopteris* subg. *Steiropteris* C. Chr., Biol. Arb. til. Eug. Warming 81. 1911. —TYPE: *Polypodium deltoideum* Swartz [≡*Thelypteris deltoidea* (Swartz) Proctor].

Glaphyropteris Presl ex Fée, Crypt. Vasc. Brés. 2:40. 1873. —*Glaphyropteris* Presl, Abh. Königl. Böhm. Ges. Wiss. (5)5:34. 1848 (nom. nud.). —*Dryopteris* subg. *Glaphyropteris* (Presl ex Fée) C. Chr., Biol. Arb. til. Eug. Warming 80. 1911. —*Thelypteris* subg. *Glaphyropteris* (Presl ex Fée) Alston, J. Wash. Acad. Sci. 48:234. 1958. —TYPE: *Glaphyropteris decussata* (L.) Presl ex Fée [≡*Polypodium decussatum* L.].

Rhizome creeping to suberect; blade with lowermost pinnae longest or nearly so (one species with auriculiform, greatly reduced basal pinnae), pinnatifid to pinnate-pinnatifid in most species; aerophores usually present at base of costae, sometimes also at base of costules, the aerophores scalelike or peglike; veins running to the sinus or ± connivent with a cartilaginous keel running from the sinus toward the costa (false vein), or veins meeting margin just above the sinus and without false veins; costae and veins below with acicular hairs, these simple or septate, never stellate or hooked; glands absent on leaf tissue (present in one species); sori round to slightly oblong, indusiate or exindusiate (ours) in a few species; sporangia glabrous (setose in two species); spores with a winged sporoderm, the ridges narrow and sometimes anastomosing; *x* = 36.

About 20 species, confined to the American tropics. The bulk of species occurs in the Antilles and northern South America. I circumscribe subg. *Steiropteris* to include part of *Glaphyropteris* (*T. decussata* and allies), while referring the rest of *Glaphyropteris* sensu Christensen (*T. thomsonii* and allies) to subg. *Amauropelta*. A single species of subg. *Steiropteris* is known from Chiapas, and a second, *T. decussata,* is to be expected.

53. Thelypteris glandulosa (Desv.) Proctor var. brachyodus (Kunze) A. R. Smith, Phytologia 34:233. 1976.

—*Polypodium brachyodus* Kunze, Linnaea 9:48. 1834. —*Dryopteris brachyodus* (Kunze) O. Ktze., Rev. Gen. Pl. 2:812. 1891. —*Thelypteris brachyodus* (Kunze) Ching, Bull. Fan Mem. Inst. Biol., Bot. 6:280. 1936. —TYPE: Peru, Pampayaco, *Poeppig s.n.* (isotype W!).

ILLUSTRATION: none found.

Rhizome stout, short-creeping to suberect, 2–3 cm thick; stipe often 50–80 cm long, tan to brownish, glabrous; rachis pubescent (hairs 0.2 mm or less) to glabrescent, without buds; lamina 30–75 cm long, abruptly narrowed above with a hastate terminal segment; pinnae alternate, 8–10 pairs, remote (5–8 cm), to 27 cm long, largest mostly 3–4 cm broad, lower distinctly stalked (to 5 mm), with an obtuse aerophore (to 2 mm) at base, apex caudate, base of lower pinnae reduced; lower pinnae not shortened, incised scarcely to the middle; segments to 8 mm broad (7–10 mm between costules), subfalcate, rounded at tip; veins simple, 12–18-jugate, lower 3–4 forming narrow areoles between the costule and the prominent sinus membrane (a false vein from sinus to costae); leaf tissue dark green above, lighter green below, glabrous on both sides, costae (sometimes also costules and sinus membrane) beneath puberulous (hairs 0.1 mm long, simple); costae beneath with a few linear tan scales near base; sori medial to inframedial toward segment apex, exindusiate; sporangia glabrous.

Known from a single locality in wet Tropical Rain Forest; Eastern Highlands adjacent to Guatemala border; 300 m. Belize, Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Peru). CHIAPAS COLLECTION: *34189.*

The type variety occurs in the Lesser Antilles and northern South America. It differs slightly from var. *brachyodus* in the usually opposite pinnae, more falcate segments, and lighter green color. These differences are not of a magnitude to warrant recognition of two species.

SPECIES TO BE LOOKED FOR IN CHIAPAS

Thelypteris (subg. *Goniopteris*) *asterothrix* (Fée) Proctor — Guat. to Ven., Cuba, Jam.; similar to some forms of *T. reptans,* but blades not prolonged and not rooting at tip nor gemmiparous along rachis, and sporangia setose by furcate hairs.

Thelypteris (subg. *Goniopteris*) *praetermissa* (Maxon) A. R. Smith —Bel., Guat., Hond.; similar to *T. nicaraguensis,* but sporangia with minute furcate or stellate hairs. To be looked for at lower elevations of the Atlantic slope.

Thelypteris (subg. *Goniopteris*) *schippii* (Weatherby) A. R. Smith —Bel.; most closely related to Antillean species with pinnatifid blade apices, gemmiparous buds, and setose indusia.

Thelypteris (subg. *Goniopteris*) *skinneri* (Hook.) Reed — Bel., Guat.; differs from all known Mexican species by the laminae merely pinnatifid about two-thirds the way to the midrib with about 2 pairs of free, small pinnae below. To be looked for at lower elevations along the Pacific coast.

Thelypteris (subg. *Steiropteris*) *decussata* (L.) Proctor var. *decussata* —Guat., Nic., C.R., Pan., W.I., Col. to Fr. Gui. and Peru; distinguished by the long aerophores, presence of sessile red glands below, and extremely large fronds with many close veins.

99. TRICHIPTERIS

Trichipteris Presl, Delic. Prag. 1:172. 1822 (often as *Trichopteris*). —Type: *Trichipteris excelsa* Presl [=*T. corcovadensis* (Raddi) Copel.].

Trichopteris Necker (Elem. Bot. 1:110. 1790) is regarded as a unitary designation of a species and is thus not valid as a generic name (Code, Art. 20).

Plants arborescent; fronds very large; stipe smooth to tuberculate to spiny, often with trichomes; stipe base scales structurally marginate, with a narrow to broad margin of cells different in orientation, size, and usually in shape and color from those of central portion, lacking dark setae, the apex rounded to filamentous; costae usually pubescent above; veins free, in lobed or pinnatifid segments the basal veins on each side extending above base of sinus; indusia absent; spores tetrahedral, with trilete scar, 64 per sporangium; $x = 69$.

About 55 species (Barrington, 1978) restricted to the Neotropics. The principal center of diversity is in the Andes and the Guayana Highlands, but there are important lesser concentrations of species in southern Brazil, Greater Antilles, and southern Mexico–Guatemala. *Trichipteris* species occur primarily in low to middle elevation rain forests; several species have adapted to partially disturbed conditions, as cut-over forests and edges of woods, and may even grow in full or partial sun.

References: Barrington, D. S. 1978. A revision of the genus *Trichipteris*. Contr. Gray Herb. 208:1–93; Maxon, W. R. 1922. Studies of tropical American ferns—No. 7. The North American species of *Alsophila* grouped with *A. armata*. Contr. U.S. Natl. Herb. 24:33–46; Riba, R. 1967. Revision monografica del complejo *Alsophila swartziana* Martius (Cyatheaceae). Anales Inst. Biol. Univ. Nac. México, Bot. Ser. 38:61–100; 1969. The *Alsophila swartziana* complex (Cyatheaceae). Rhodora 71:7–17. Tryon, R. 1970. The classification of the Cyatheaceae. Contr. Gray Herb. 200:3–53.

a. Primary rachis strongly aculeate throughout; costae also aculeate; paraphyses very numerous, flaccid, moniliform, persistent in a lax tuft, longer than sporangia .... 4. *T. microdonta*

aa. Primary rachis slightly, if at all, aculeate above the base; costae smooth or merely muricate; paraphyses shorter or longer than sporangia.

- b. Sori subtended by squamulae attached near base of receptacle; stipe scurf absent .... 2. *T. costaricensis*
- bb. Sori without subtending scales; stipe scurf present.
  - c. Costae and costules below without long-spreading, septate hairs; scales on costae below bullate, castaneous; ultimate segments rounded at tip, entire .... 5. *T. schiedeana*
  - cc. Costae and costules below long-hirsute, the hairs stiff, septate; scales on costae below flat to bullate, whitish to tan; segments acute to rounded at tip, crenulate to serrate to pinnatifid along the margins.
    - d. Fertile segments pinnatifid; primary and secondary axes with scattered, large, flat, persistent, whitish scales; stipe base scales whitish, concolorous .... 3. *T. mexicana*
    - dd. Fertile segments crenate-serrate to crenate-dentate to serrately incised; axes lacking large, white, flabellate scales; stipe base scales bicolorous, with a dark central stripe .... 1. *T. bicrenata*

1. **Trichipteris bicrenata** (Liebm.) Tryon, Contr. Gray Herb. 200:44. 1970.

—*Cyathea bicrenata* Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:289. 1849. —*Alsophila bicrenata* (Liebm.) Fourn., Mex. Pl. 1:134. 1872. —Syntypes: Mexico. Oaxaca, "inter Totontepec et Trapiche de la Concepcion," *Liebmann* [Liebm. Pl. Mex. 2091, Fl. Mex. 924, 925, 926, 927, 928] (C—folio herb.! isosyntypes US, K—2 sheets, *s.n.*!); Puebla, Chinautla, "inter Huitamalco et Tinzatlan," 6500 ft, *Liebmann* [Liebm. Pl. Mex. 2092, Fl. Mex. 929] (C—folio herb.!). I choose Fl. Mex. 926 as lectotype.

Alsophila scabriuscula Maxon, Proc. Biol. Soc. Wash. 32:125. 1919. —*Trichipteris scabriuscula* (Maxon) Tryon, Contr. Gray Herb. 200:44. 1970. —Type: Guatemala, Alta Verapaz, Cubilquitz, *v. Tuerckheim s.n.* [Donn.-Smith 7806] (US; isotypes K! NY).

Alsophila pansamalana Maxon, Contr. U.S. Natl. Herb. 24:40. 1922. —*Trichipteris pansamalana* (Maxon) Tryon, Contr. Gray Herb. 200:44. 1970. —Type: Guatemala, Alta Verapaz, Pansamala, *v. Tuerckheim s.n.* [Donn.-Smith 1008] (US; isotypes K! UC!).

Illustrations: Riba (1967:pl. 1, fig. 2, stipe scale; pl. 2, figs. 1–3, stipe vasculature; pl. 15, photo of isotype).

Trunk mostly 5–15 m tall; fronds 3.5–6 m long, stipe stramineous to tan, aculeate, spines stout, conical, to 5 mm long; stipe base scales bicolorous, with a broad to narrow, castaneous central stripe and whitish margins; scurf of whitish trichomidia; stipe and rachis glabrescent to hairy, hairs stout, stiff; blades to 4 m or more long, deeply 2-pinnate-pinnatifid; pinnules sessile; ultimate segments crenate to bicrenate to pinnatifid; rachis with or without spines; costae, costules, and segment midribs below with whitish, flattish to bullate scales, these most numerous at base of costules; sori medial; paraphyses generally shorter than sporangia.

Edges of Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; ca. 1700 m. Southern Mex. (Pue., Ver., Gro., Oax.), Guat. CHIAPAS COLLECTIONS: *P 7221* (PH, UC, US); *8932*; *23123*; *32338*; *32632*; *40864*.

Riba (1967, 1969) distinguished *T. pansamalana* from *T. bicrenata* on the basis of the former having stipe base scales with a broad dark central stripe (vs. narrow in *T. bicrenata*) and continuous dark teeth along the margin (vs. whitish cells between the teeth in *T. bicrenata*). Those few Chiapas specimens that show stipe base scales have a broad central stipe and discontinuous dark marginal teeth. The only other difference that I can find between the two is a glabrous rachis in *T. pansamalana* and sparsely hairy (but often glabrescent) rachis in *T. bicrenata*. These differences seem trivial, and I think it best to treat the two as conspecific.

Maxon (1919) distinguished *T. scabriuscula,* from *T. bicrenata* by the latter having "much smaller, narrower pinnules, the segments glabrous above, and the costules beset with numerous, persistent, white, bullate scales beneath." Size of pinnae and hairiness are quite variable in this and related species, and I am unable to use these characters to distinguish collections from southern Mexico and Guatemala. Additionally, both Maxon (1922) and Riba (1967) cited *Fink 5* (K! UC!) from Veracruz as *T. scabriuscula,* and it has more numerous bullate scales than most specimens of *T. bicrenata* that I have seen. Thus, I do not think that scale density can be used to separate the two. Riba (1967, 1969) distinguished *T. scabriuscula* from *T. bicrenata* by the former having denser stipe pubescence, but again this is a highly variable character. No doubt, much of the variation that has been observed can be related to frond age (hairs are often deciduous with age) and whether the fronds are fertile or sterile (sterile fronds tend to have serrately incised segments, e.g. *32338*).

2. **Trichipteris costaricensis** (Mett. ex Kuhn) Barrington, Rhodora 78:1. 1976.

—*Hemitelia costaricensis* Mett. ex Kuhn, Linnaea 36:159. 1869. —*Cyathea costaricensis* (Mett. ex Kuhn) Domin, Acta Bot. Bohem. 9:107. 1930. —LECTOTYPE (chosen by Barrington, 1978:76): Costa Rica et Veragua, *Warscewicz 36* (B; fragm. NY, US; isolectotype UC!).

ILLUSTRATIONS: Maxon, Contr. U.S. Natl. Herb. 17:pl. 21. 1914; Barrington (1978:78, figs. 114–115).

Trunk to 8 m tall; fronds to ca. 3 m long, with stipe 15–50 cm long, stramineous to tan, without spines, sometimes minutely tuberculate; stipe base scales bicolorous, central stripe castaneous, margins tan to whitish; scurf absent on stipe or consisting of few trichomidia and whitish squamulae, these early-deciduous; blade to ca. 2.5 m long, deeply 2-pinnate-pinnatifid; pinnules sessile to stalked ca. 4 mm; ultimate segments suboblique, subfalcate, acute at apex, entire to usually crenulate or serrate; rachis and costae below glabrous; costules and segment midribs below with whitish to tan, shining, flat to subbullate scales, often also with whitish trichomidia; sori inframedial to medial, subtended by one to several whitish subbullate scales; paraphyses shorter than sporangia.

Edges of Seasonal Evergreen Forest, often in full or partial sun; uncommon in s Pacific Coastal Plain, Northern Highlands (not Jitotol Ridge); 200–1200 m. Southern Mex. (Nay., Jal., Mich., Gro., Ver., Oax., Tab.), Guat., Salv., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *P 6712* (F, MO, NY, none seen; UC, US); *EM 17102* (MEXU, US); *Fi 35396* (F, MO, NY, US, none seen, cited by Barrington, 1978:76); *22526*; *24184*; *31564*.

3. **Trichipteris mexicana** (Mart.) Tryon, Contr. Gray Herb. 200:44. 1970.

—*Alsophila mexicana* Mart., Icon. Pl. Crypt. Bras. 70, pl. 45. 1834. —*Cyathea valdecrenata* Domin, Pteridophyta 263. 1929. —TYPE: Mexico, Oaxaca, "S. Pablo de Teoxomulco," *Karwinski s.n.* (fragment F).

Alsophila godmanii Hook., Syn. Fil. 36. 1866. —TYPE: Guatemala, Cobán, *Salvin & Godman s.n.* (K!).

ILLUSTRATIONS: **Fig. 57**; Hemsley, Biol. Centr.-Amer. 5:pl. 103. 1885; Tryon (1970:43, figs. 39–40, stipe scales); Barrington (1978:78, figs. 120–121).

Trunk to 10 m tall; fronds mostly 2–4 m long with stipe to 1 m long, stramineous to brown, tuberculate to muricate with spines 1 mm long or less; stipe base scales concolorous (ours) except at point of attachment, light beige to whitish; stipe and rachis with scurf or whitish trichomidia and darkened squamulae, also with rather dense, long, stout hairs; blade mostly 2–3 m long (ours), deeply 2-pinnate-pinnatifid to 3-pinnate-pinnatifid; pinnules sessile, deeply pinnatifid to fully pinnate; ultimate segments crenulate to pinnatifid; rachis, costae, and often costules below with numerous stout hairs and also whitish trichomidia, also with scattered, whitish to beige, flabellate to roundish to ovate, flat scales; costules and segment midribs with whitish to tan bullate scales; sori inframedial; paraphyses longer than sporangia.

Edges of Montane Rain Forest; uncommon in SE corner of Central Plateau, s Sierra Madre; 1300–1900 m. Southern Mex. (Oax.), Guat., Hond. CHIAPAS COLLECTIONS: *P 6767* (F, MO, NY, UC, US, the first three not seen); *GM 41* (DS); *GM s.n.* (DS); *X&S X-462* (US, not seen, cited by Barrington, 1978); *EM 17435* (F, not seen, cited by Barrington, 1978); *22648*; *29657*; *31957*; *32260*; *35251*.

4. **Trichipteris microdonta** (Desv.) Tryon, Contr. Gray Herb. 200:46. 1970.

—*Polypodium microdontum* Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5:319. 1811 [as *P. microdonton*]. —*Alsophila microdonta* (Desv.) Desv., Mém. Soc. Linn. Paris 6:319. 1827. —TYPE: "America australi?," collector not stated, Herb. Desvaux (P; photo UC!).

For additional synonymy, see Barrington (1978:56).

ILLUSTRATION: Barrington (1978:58, figs. 76–78).

Trunk to 6 m tall; fronds to ca. 4 m long, stipe 0.6–1.8 m long, tan to atropurpureous, aculeate; stipe base scales concolorous, brownish; scurf absent or of darkened trichomidia; blade 1–2.5 m long, deeply 2-pinnate-pinnatifid; pinnules short-stalked; ultimate segments acute at apex, the tip crenulate to serrate; rachis and costae below with spines, also with trichomidia and a few trichomes; costules and midribs below with flattish to bullate, whitish to tan squamulae; veins glabrous below or with a few trichomidia; sori medial; paraphyses equaling to longer than sporangia; $n = 69$ (Jam.).

Habitat of our collections not known, but according to Barrington (1978), this species is found in "swamps and bogs, along riverbanks, and in standing fresh or brackish water"; uncommon in s Pacific and Gulf coastal plains; ca. 100 m. Southern Mex. (Ver., Tab.), Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Peru and Fr. Gui., Braz.); Gr. Antill. (exc. P.R.). Trin. CHIAPAS COLLECTIONS: *EM 17435* (F, GH, MEXU, US, the first two not seen, cited by Barrington, 1978); *X&S X-241* (US); *Se 5515* (GH, not seen, cited by Barrington, 1978).

5. Trichipteris schiedeana (Presl) Tryon, Contr. Gray Herb. 200:44. 1970.

—*Alsophila schiedeana* Presl, Tent. Pterid. 62. 1836. —*Cyathea schiedeana* (Presl) Domin, Pteridophyta 263. 1929. —TYPE: based on *Polypodium* sp. in Schlecht. & Cham., Linnaea 5:609. 1830, Mexico [Veracruz], "inter Huitamalco et Cuapa," *Schiede & Deppe* [757] (isotypes B, P; fragments F, GH, US).

For additional synonymy, see Barrington (1978:38).

ILLUSTRATIONS: Maxon, Annual Rep. Board Regents Smithsonian Inst. 1911:pl. 10. 1912; Stolze, Fieldiana, Bot. 39:125, fig. 25, a, b. 1976; Barrington (1978:42).

Trunk mostly 1–7 m tall; fronds to nearly 3 m long, with stipe 0.3–0.7 m long, stramineous to brownish, aculeate, also with minute brownish scurf; stipe base scales brown, concolorous or with a very inconspicuous whitish margin, lustrous; blade mostly 1–2 m long, deeply 2-pinnate-pinnatifid; pinnules sessile to stalked ca. 1 mm; ultimate segments suboblique, rounded at apex, entire (ours); costae, costules, and segment midribs below with brown, flatish to often bullate, lustrous scales, also with a few scattered stout hairs, these deciduous and often not seen; leaf tissue dark green, glabrous below; sori medial; paraphyses shorter than the sporangia.

In Tropical and Montane rain forests; uncommon in Northern and Eastern highlands (not Jitotol Ridge), s Sierra Madre; 300–800 m. Southern Mex., (Gro., Oax., Ver., Tab.), Bel., Guat., Salv., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *G 363* (YU); *G 406a* (YU); *Fi 35390* (F, MO, NY, none seen; US); *GM 29* (DS); *P 6713* (GH, not seen; UC, US); *P 7233* (UC, US); *21892*; *33008*; *34106*. Those collections not seen were cited by Barrington (1978:39).

SPECIES TO BE LOOKED FOR IN CHIAPAS

Trichipteris ursina (Maxon) Tryon —Bel., Nic., C.R. Distinguished from all other Chiapas species by 1-pinnate-pinnatifid fronds with densely scaly rachis.

Trichipteris scabriuscula (Maxon) Tryon —see discussion under *T. bicrenata*.

100. TRICHOMANES

Trichomanes L., Sp. Pl. 2:1097. 1753. —LECTOTYPE (chosen by J. Smith, Hist. Fil. 347. 1875): *Trichomanes scandens* L.

Didymoglossum Desv., Mém. Soc. Linn. Paris 6:330. 1827. —LECTOTYPE (chosen by Christensen, Ind. Fil. xiv. 1906): *Didymoglossum muscoides* (Swartz) Desv. [≡*Trichomanes hymenoides* Hedwig].

For additional synonymy, see Morton (1968).

Plants commonly epiphytic, a few species terrestrial; rhizome commonly filiform, long-creeping (in some species erect), lacking scales but with septate hairs at apex; fronds simple to many times pinnate, usually small; blade with or without simple to stellate hairs on veins and leaf margin, scales absent; leaf tissue commonly glabrous, very thin, membranous, commonly 1 cell thick except at midribs; ultimate segments mostly adnate and decurrently joined; involucres marginal, immersed or wholly free, tubular, narrowly cylindric-cuneate to salverform, truncate and entire at the mouth, or limb (if developed) shallowly to deeply bilobed; receptacle filiform, usually long-exserted with age; x = 32, 33, 34, 36.

Pantropical, with perhaps 325 species. Following Morton (1968), I recognize *Trichomanes* in a broad sense. Copeland (1947) split *Trichomanes* into numerous small genera, and if his generic circumscriptions were to be followed, five trichomanoid genera occur in Chiapas. Seventeen species are known in Chiapas, with at least seven more to be expected from the state, most likely in the Eastern Highlands. The total number of species in the Neotropics exceeds 100.

With one exception, I follow Morton (1968) in the circumscription of subgenera and sections of *Trichomanes*. I have removed *T. pyxidiferum* from Morton's sect. *Crepidomanes* and placed it in sect. *Lacosteopsis*. Morton's placement of *T. pyxidiferum* was based on the incorrect observation that it possessed false veins.

REFERENCES: MORTON, C. V. 1968. The genera, subgenera, and sections of the *Hymenophyllaceae*. Contr. U.S. Natl. Herb. 38:153–214; WESSELS BOER, J. G. 1962. The New World species of *Trichomanes* sect. *Didymoglossum* and *Microgonium*. Acta Bot. Neerl. 11:277–330.

a. Venation anadromous; sori paratactic, terminating lateral segments of pinnae and pinnules; fronds mostly 2–4-pinnate-pinnatifid, never simple or merely lobed; segments not ciliate at the margin; false veins absent.
  b. Rhizome erect, fronds somewhat clustered; plants terrestrial; stipe rather coarse (subg. *Pachychaetum* Presl) .... 17. *T. rigidum*
  bb. Rhizome wide-creeping; plants epiphytic; stipe filiform or coarse (subg. *Trichomanes* sect. *Lacosteopsis* Prantl).
    c. Rhizome relatively thick, 1–2 mm diam.; fronds relatively large, most longer than 20 cm.
      d. Involucres with a prominent spreading collar; blade reduced at base, often nearly to rhizome; blades deeply pinnate-pinnatifid to 2-pinnate-pinnatifid .... 4. *T. collariatum*
      dd. Involucres without an apical collar, truncate at tip; blade usually not reduced at base, stipe usually longer than 5 cm; blades 3–4-pinnate .... 15. *T. radicans*
    cc. Rhizome thin, less than 1 mm diam. (excluding root hairs); fronds mostly shorter than 15 (20) cm.
      e. Stipe and main rachis (also sometimes minor rachises), not at all alate, terete; blades 3–4-pinnate, ultimate segments linear; usually epiphytic on tree ferns.
        f. Ultimate segments filiform, mostly 0.1–0.4 mm wide .... 3. *T. capillaceum*
        ff. Ultimate segments linear, mostly 0.5–0.7 mm wide .... 1. *T. angustatum*
      ee. Rachis and often upper part of stipe slightly alate; blade to 3-pinnatifid; usually not on tree ferns.

g. Involucres funnelform, ca. 2 mm long, without suddenly expanded lips .... 14. *T. pyxidiferum*
gg. Involucres cylindric, to 3 mm long, with suddenly flaring lips .... 9. *T. hymenophylloides*
aa. Venation catadromous; sori epitactic, terminating terminal segments of pinnae and pinnules; fronds simple to pinnate-pinnatifid; segments often ciliate or with sessile, stellate, marginal hairs; false veins present or absent.
h. False veins absent; fronds never simple, mostly deeply pinnatifid to 1-pinnate; plants epiphytic or terrestrial (subg. *Achomanes* Presl).
i. Fronds ciliate; blade never radicant at apex; fronds not dimorphic.
j. Cilia stellate or forked at base [sect. *Acarpacrium* (Prantl) C. Chr.] .... 13. *T. polypodioides*
jj. Cilia simple (sect. *Achomanes*).
k. At least upper part of stipe alate; fronds usually shorter than 10 cm; pinnae not overlapping .... 7. *T. galeottii*
kk. Upper part of stipe not alate; fronds mostly longer than 10 cm; pinnae often overlapping .... 5. *T. crispum*
ii. Fronds not ciliate; blade often radicant at apex; fronds dimorphic [sect. *Feea* (Bory) Christ] .... 6. *T. diversifrons*
hh. False veins present between the true veins or in a submarginal position; fronds small, simple to bipinnatifid but not truly pinnate; plants epiphytic or on rocks [subg. *Didymoglossum* (Desv.) Christensen sect. *Didymoglossum*].
l. Involucres without dark-edged lips; fronds small, ± entire (<1 cm) .... 12. *T. petersii*
ll. Involucres with dark-edged lips.
m. Fronds linear, 0.1–0.3 cm broad, ca. 1 cm long .... 2. *T. angustifrons*
mm. Fronds oblong to ovate or obovate.
n. Venation flabellate; costa wholly wanting or not extended beyond middle of frond.
o. Fronds 2–6 mm wide, 3–8 mm long, usually with a single terminal sorus .... 11. *T. ovale*
oo. Fronds much larger, usually with several sori .... 8. *T. hymenoides*
nn. Venation distinctly pinnate; costa extending to frond apex.
p. Blade entire or in upper part irregularly lobed; thin, tan, stellate hairs on the whole margin .... 11. *T. ovale*
pp. Blade pinnatifid or bipinnatifid; stellate hairs mainly in the sinuses, simple or bifid, stout, blackish hairs on the margins.
q. Sori ± immersed; nearly all false veins free and partly parallel to blade margin .... 10. *T. krausii*
qq. Sori exserted; most false veins connected to true veins and not parallel to blade margin.
r. Involucral lips rather long; false veins many; sori distant; fronds mostly 3–8 cm long .... 16. *T. reptans*
rr. Involucral lips short and broad; false veins few; sori approximate; fronds mostly 1–3 cm long .... 8. *T. hymenoides*

1. **Trichomanes angustatum** Carm., Trans. Linn. Soc. London 12:513. 1818.

—*Vandenboschia angustata* (Carm.) Copel., Philipp. J. Sci. 73:466. 1941. —Type: Tristan da Cunha, *Capt. Carmichael s.n.* (BM! K!).

Trichomanes tenerum Spreng., Syst. Veg. 4:129. 1827. —*Vandenboschia tenera* (Spreng.) Copel., Philipp. J. Sci. 67:53. 1938. —Type: Brazil, collector not stated.

Illustrations: Lowe, New Ferns pl. 67. 1862; Martius, Fl. Bras. 1(2):pl. 18. 1859; Vareschi, Fl. Venez. 1(1):pl. 51. 1969.

Closely related to *T. capillaceum*, differing in the slightly broader ultimate segments (ca. 0.5–0.7 mm wide), with the penultimate rachises not terete; n = 72 (Tristan da Cunha).

Usually epiphytic on tree ferns; in Chiapas, known with certainty from a single collection, "Pedro River." Widespread in the American tropics, but exact distribution uncertain because of problems in circumscription and confusion with *T. capillaceum*; known with certainty from s Mex. (Chis. only?), Guat., Hond., S.A. (Col. to Bol., Urug., Parag., nw Arg., s Braz.), Gr. Antill., and Tristan da Cunha. Chiapas Collection: *GM 108*, pt. (DS).

Typical specimens of *T. angustatum* are quite distinct from *T. capillaceum*, but there seem to be numerous intermediates, especially from Mexico. Still, true *T. capillaceum* is not known from southern Brazil, where *T. angustatum* is common; nor is *T. angustatum* found in Costa Rica and Panama, where *T. capillaceum* is common. The whole group of species needs monographic attention before names can be applied with confidence.

2. **Trichomanes angustifrons** (Fée) W. Boer *in* Kramer, Fl. Neth. Antill. 1:17. 1962.

—*Didymoglossum angustifrons* Fée, Mém. Fam. Foug. 11:113, pl. 28, fig. 5. 1866. —Type: Guadeloupe, *L'Herminier s.n.* (isotype P!).

Illustrations: see original; Wessels Boer (1962:290, figs. 12–13).

Fronds often linear to linear-oblong, 0.5–1.5 cm long, 1–3 mm wide, entire or nearly so, or well-developed fronds cuneiform, in upper part irregularly pinnatilobed; stipe short, upwards narrowly winged; blade thin and translucent, margins ciliate with 1–4 (or more)-rayed stellate hairs; costa percurrent, with each of the strong secondary veins forming a costule for the distinct lobes, lobes with numerous, partly branched and mostly unconnected lateral veinlets; sori solitary in apical lobes; involucres immersed up to the large, semiorbicular lips, not contracted at neck, lips broader than tube and with one to few marginal rows of dark cells.

Epiphytic on tree trunks, in Montane Rain Forest; rare, known in Chiapas from two collections e of Lago Tziscao (se corner of Central Plateau); 1300 m. Southern Mex. (Chis.

only), C.R.; S.A. (Ven. to Fr. Gui., south to s Braz., Parag.; Peru); Antill., Trin. Chiapas Collections: *32179*; *35257*.

3. **Trichomanes capillaceum** L., Sp. Pl. 2:1099. 1753.

—*Vandenboschia capillacea* (L.) Copel., Philipp. J. Sci. 67:53. 1938. —Type: uncertain; LINN 1253.11 is this species, but was apparently not in LINN in 1753 (Jackson, 1912). Plumier (Tract. Fil. Amer. pl. 99D, 1705) and Petiver (Pter. Amer. pl. 10, fig. 7, 1712) illustrations cited, showing a plant from Hispaniola.

Trichomanes trichoideum Swartz, J. Bot. (Schrader) 1800(2):98. "1801" [1802]. —An illegitimate renaming of *Trichomanes tenellum* Hedwig (see Morton, Contr. U.S. Natl. Herb. 38:274. 1973).

Trichomanes hypnoides Christ, Bull. Herb. Boissier (2)5:725. 1905. —Type: Mexico, Chiapas, Zontehuitz, *Münch 108* (P? not found; isotype DS!).

Illustrations: Vareschi, Fl. Venez. 1(1):pl. 47. 1969; Hooker & Greville, Icon. Fil. 2:pl. 199. 1830–31.

Rhizome filiform, wide-creeping, deciduously radiculose; fronds subdistant, mostly 6–20 cm long, with short stipes mostly less than 3 (5) cm long; blade finely 3–4-pinnate, mostly 1.5–4.0 (6) cm broad, rachises flexuose, all but ultimate ones terete; pinnae close, often imbricate, lowermost somewhat reduced and more distant; ultimate segments distant, narrowly linear, oblique, simple, mostly 2–5 mm long, 0.1–0.4 mm broad at the truncate or emarginately obtuse tip; leaf tissue delicately membranous, glabrous; sori appearing subaxillary, borne chiefly near the main rachis, involucres stalked, narrowly cylindric-cuneate, abruptly and (usually) broadly expanded at apex; $n = 36$ (Jam., C.R.).

Epiphytic (usually on tree fern trunks), infrequently on wet stream banks or rocks, in Montane Rain Forest, infrequently Lower Montane Rain Forest, Evergreen Cloud Forest; common in Northern Highlands (especially Jitotol Ridge), scattered in the Sierra Madre, Eastern Highlands, Central Plateau; 800–2700 m. Southern Mex. (Mlos., Pue., Oax., Ver.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven., Col., Ecu.); Gr. Antill. Chiapas Collections: *R 961* (PH); *P 6746* (BM, UC, US); *L&S 9884* (US); *GM 108*, pt. (DS, P); *19948*; *22673*; *23142*; *26067*; *29449*, pt.; *29810*; *30906*; *31545*; *31673*; *31932-A*; *32196*; *32374*; *32609*; *33027*; *34383*; *38021*; *42578*.

Nearly all Chiapas collections (and also those from elsewhere in Mexico) are more or less intermediate between *T. capillaceum* and *T. angustatum*. Only the Münch collection cited (type of *T. hypnoides*), agrees well with material of *T. capillaceum* from the Antilles and southern Central America. Monographic revision of this complex is badly needed.

4. **Trichomanes collariatum** v. d. Bosch, Ned. Kruidk. Arch. 4:368. "1859" [1858].

—Type: Mexico, Tabasco, *Linden* (a probable isotype is *Linden 1508*, K!, collected in Tabasco, Teapa; see Morton, Contr. U.S. Natl. Herb. 38:271. 1973).

Trichomanes repens Schott ex Sturm *in* Martius, Fl. Bras. 1(2):264. 1859. —Type: locality not stated, "Hb. Mus. Pal. Vindob. n. 4480" (W, photo BM!).

Trichomanes martinezii Rovirosa, Pterid. Sur Mex. 106, pl. 7A, figs. 1–3. 1909. —Type: Mexico, Chiapas, "fluvii Lacanja," *Martinez s.n.* [herb. no. 1103] (not found).

Illustrations: see above under *T. martinezii*; Shimek, Bull. Lab. Nat. Hist. Iowa State Univ. 4:pl. 3. 1897 [as *T. radicans*]; Stolze, Fieldiana, Bot. 39:75, fig. 13a–b. 1976.

Rhizome long-creeping, ca. 1.0–1.5 mm diam.; fronds distant, mostly 20–35 cm long, stipe much shorter than blade, 0.5–3.0 cm long, greenish-alate; blade linear-oblong, mostly less than 6 cm broad, 2–3-pinnatisect, rachis narrowly alate; pinnae spreading, lowermost 1–4 pairs reduced and often deflexed; penultimate segments often flabellate or obovate, 2–5-fid or more at tip; leaf tissue membranous, glabrous, opaque, drying dark green; sori with a ± cylindrical involucre, at the tip greatly expanded laterally to form a collar, nearly free from leaf tissue or faintly greenish-marginate; receptacles short-exserted; $n = 36$ (Oax.).

Epiphytic and climbing on tree trunks, in Tropical, Lower Montane, and Montane rain forests; uncommon in Northern and Eastern highlands; 300–800 m. Southern Mex. (Tab., Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Col., Peru, n Braz.). Chiapas Collections: *GM 1* (DS)?; *20992*; *22467*; *34073*; *42016*.

Related to *T. radicans,* but distinguished by the involucres with flared lips. *Trichomanes collariatum* occurs at lower elevations in Chiapas than *T. radicans*; the two species apparently do not grow together.

5. **Trichomanes crispum** L., Sp. Pl. 2:1097. 1753.

—Lectotype (chosen by Proctor, Fl. L. Antill. 2:95. 1977): Plumier's Tract. Fil. Amer. pl. 86, 1705, illustrating a plant from Martinique. According to Jackson's index (1912) LINN 1253.2 was in LINN in 1753; however, it is not *T. crispum* but *T. polypodioides* L. as that species is currently understood.

Illustrations: Copeland, Philipp. J. Sci. 67:pl. 8. 1938; Hedwig, Fil. Gen. et Sp. pl. 4, fig. 2. 1799.

Rhizome short-creeping to suberect, 5–8 mm diam., densely clothed with long, rigid, dark brown, septate, lustrous hairs; fronds caespitose, mostly 10–40 cm long, with stipe mostly ¼–⅔ blade length, not alate, laxly clothed with ferruginous hairs; blade lance-oblong, 2.5–6 cm broad, not or only slightly reduced at base, there pinnate to pinnatisect, subpinnatisect upwards; pinnae usually close or imbricate, patent, oblong, 5–10 mm broad, usually rounded at apex, subcordate at lower base or constricted on both sides, margins subentire to sinuate; veins simple to 1 (3)-forked, with scattered tan hairs on both sides; leaf tissue glabrous, often crispate; sori 1–3 pairs on tips of pinnae, with indusia cylindric-cuneate, slightly flared at apex, to 3 mm long, immersed, with long-exserted receptacles; $n = 128$ (Jam., Trin.).

Epiphytic or terrestrial in Montane Rain Forest, Pine-Oak Forest; uncommon in Northern and Eastern highlands, se corner of Central Plateau; 800–1300 (1600) m. Southern Mex. (Oax.?), Guat., Nic., C.R.; S.A. (Ven. and Col. to Guy. and Bol., Braz., Parag.); Antill., Trin. Chiapas Collections: *GM s.n.* (DS); *R 965* (PH); *29904*; *32973*; *38884*; *42066*.

There are many described species that appear very similar to *T. crispum,* differing in such slight characters as density of hairs, habit of rhizome, size of fronds, and closeness of pinnae. Ultimately, many of these may prove specifically inseparable. Some of the more closely related ones are *Trichomanes pellucens* Kunze, *T. plumosum* Kunze, *T. badium* Fourn., *T. dactylitis* Sod., *T. accedens* Presl, *T. robustum* Fourn., and *T. aureovestitum* Proctor.

6. **Trichomanes diversifrons** (Bory) Mett. ex Sadeb., Nat. Pflanzenf. 1(4):108. 1899.

—*Hymenostachis diversifrons* Bory, Dict. Class. d'Hist. Nat. 8:462. 1825. —*Feea diversifrons* (Bory) Copel., Philipp. J. Sci. 67:74. 1938. —TYPE: "Guiane," *Poiteau s.n.* (presumably P).

Trichomanes elegans Rudge, Icon. Pl. Gui. 24, pl. 35. 1805 (not Rich., 1792). —TYPE: "Guiana Gallica," *Martin s.n.* (ex Herb. Rudge) (BM!).

ILLUSTRATION: Bory, Dict. Class. d'Hist. Nat. 17:pl. 42, fig. 2. 1831.

Rhizome suberect, caudices 5–10 mm diam., apex bearing numerous, stiff, atropurpureous, shining hairs; fronds dimorphic, the sterile 15–25 cm long, with stipes ca. ⅓ blade length, the fertile longer, to ca. 35 cm long, with stipe equaling or longer than blade; sterile blade deeply pinnatifid, 3.5–6.5 cm broad, narrowed on both sides of middle, apex often radicant and proliferous; largest pinnae ca. 5 mm broad, acutish at tip, serrulate along margin; veins forking several times, casually anastomosing; leaf tissue glabrous on both sides, dull, opaque; fertile blade ca. 6–8 mm broad, bearing one long row of sori on each side of midrib; involucres immersed, lips not flared; receptacles exserted or not.

Terrestrial in Tropical Rain Forest; rare in Eastern Highlands near Guatemala border; 300 m. Southern Mex. (Chis. only), Bel., Guat., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., Braz.). CHIAPAS COLLECTIONS: *G 442* (K, PH); *34109.*

Hall (Catalog of a collection of ferns, p. 8. 1873) listed the Ghiesbreght collection at YU as having been collected in Tabasco; the PH and K collections that I have seen stated Chiapas.

7. **Trichomanes galeottii** Fourn., Bull. Soc. Bot. France 15:147. 1868.

—SYNTYPES: Mexico. [Oaxaca], *Galeotti 6530*; [Oaxaca], "Teotalcingo," *Liebmann s.n.*; Cuba, *Wright 1818* (all P!; isosyntype of *Liebmann s.n.* at K!). I choose *Galeotti 6530* as lectotype (photo BM!).

ILLUSTRATION: **Fig. 80.**

Related to *T. crispum* but distinguished by the smaller fronds (usually less than 10 cm long); stipe alate for most of its length; rachis strongly alate with the wing connecting the pinnae (pinnae not contracted at the base); pinnae not imbricate.

Epiphytic and on wet rocks and banks in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands and SE corner of Central Plateau; 800–1350 m. Distribution uncertain but at least s Mex. (Oax.), Bel., Guat., Nic., C.R.; Cuba. CHIAPAS COLLECTIONS: *21893* (atypical); *32543*; *35243*.

As stated by Morton (1968:194), sect. *Achomanes* subsect. *Crispa* is badly in need of revision; I agree. I am not at all certain that *T. galeottii* can be adequately distinguished from *T. crispum*. The chief characters distinguishing the two might easily be characters associated with fronds that mature at a smaller size. Juvenile fronds of *T. crispum* seem to show charaters of *T. galeottii*.

Breedlove 21893, collected on sandstone cliffs, is very atypical and perhaps represents an undescribed species. The segments are wide-spaced and strongly ascending, and the stipe and rachis are very broadly winged. I hesitate to describe it because of a paucity of material and because of circumscription problems of related species.

8. **Trichomanes hymenoides** Hedwig, Fil. Gen. et Sp. pl. 3, fig. 3. 1799.

—*Trichomanes muscoides* Swartz, J. Bot. (Schrader) 1800(2):95. "1801" [1802] (nom. superfl., illeg.). —*Didymoglossum muscoides* (Swartz) Desv., Mém. Soc. Linn. Paris 6:330. 1827. —*Didymoglossum hymenoides* (Hedwig) Copel., Philipp. J. Sci. 67:77. 1938. —TYPE: not found by W. Boer (1962), who designated Hedwig's plate as lectotype; probably based on a Jamaican specimen collected by *Swartz,* type in G? (see Morton, Contr. U.S. Natl. Herb. 38:77. 1967).

Microgonium schaffneri v. d. Bosch ex Fée, Mém. Fam. Foug. 9:38. 1857 (nom. nud.). —Based on *Schaffner 2,* from Mexico, Veracruz, Huatusco.

ILLUSTRATIONS: Lindman, Ark. Bot. 1:13. 1903; Hooker & Greville, Icon. Fil. 1:pl. 117. 1829 [as *Trichomanes apodum*]; Fée, Crypt. Vasc. Brés. 2:pl. 85, fig. 3. 1873 [as *Didymoglossum sociale*]; Wessels Boer (1962:307, figs. 24–27).

Fronds variable and polymorphous, mostly 1.5–3.0 cm long, with stipe 1–6 mm long, upwards winged; blade ± irregularly lobed or freely pinnatifid, broadest at or near base, the lobes obtuse with uniformly branched and ramifying veins; venation subflabellate with a distinct, percurrent costa, the lobes also costate, costules bearing regularly pinnately arranged, alternating sideveins and free false veinlets between them; marginal hairs simple or binate, only in sinuses occasionally stellate, black, thick, arching or recurved; sori 1–6 per blade, confined to blade apex, close together and at same level; involucres free or only at the base somewhat immersed, urceolate, with short lips, these with one to few marginal rows of dark cells, at length opening and forming a nearly circular rim but not recurved.

Epiphytic on tree trunks, bases of trees, in Montane Rain Forest, Pine-Oak-Liquidambar Forest; widely scattered localities in the Northern Highlands (Jitotol Ridge), Sierra Madre, SE corner of Central Plateau; 1300–2000 m. Southern Mex. (Ver., Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., s Braz., Urug., Parag., NE Arg.); Antill., Trin. CHIAPAS COLLECTIONS: *22387,* pt.; *23208*; *25006*; *25007*; *31976*; *32114*; *32206*; *32426*; *34383*.

9. **Trichomanes hymenophylloides** v. d. Bosch, Ned. Kruidk. Arch. 5(3):209. 1863.

—*Trichomanes leptophyllum* v. d. Bosch, Ned. Kruidk. Arch. 4:363. "1859" [1858] (not A. Cunn., 1836). —*Vandenboschia hymenophylloides* (v. d. Bosch) Copel., Philipp. J. Sci. 67:53. 1938. —TYPE: St. Vincent, *Guilding s.n.* (isotype GH).

ILLUSTRATIONS: Hooker & Greville, Icon. Fil. 2:pl. 206. 1831 [as *T. pyxidiferum*]; Slosson, Bull. Torrey Bot. Club 42:pl. 31. 1915; Hedwig, Fil. Gen. et Sp. pl. 3, fig. 2 and c. 1799 [as *T. pyxidiferum*].

Rhizome filiform, wide-creeping; fronds distant, mostly 5–15 cm long, stipe ⅓–⅔ as long as blade, alate distally; blade oblong to ovate, mostly 2–4 cm broad, deeply 3-pinnatifid (lower pinnae nearly free); pinnae ascending, lowermost often slightly reduced; ultimate segments linear, mostly 2–5 mm long, 0.2–0.6 mm wide, simple or bifid at the acutish apex; leaf tissue thin, translucent, usually light green, glabrous; sori with involucres free to green-winged at base, narrowly cylindric-cuneate, abruptly expanded at apex, ca. 3 mm long, 1.0–1.3 mm broad at apex; $n = 36$ (Jam., Trin.).

Epiphytic or on rocks in Montane Rain Forest, infrequently Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), s Sierra Madre, SE edge of Central Plateau; 1300–2700 m. Southern Mex. (Mlos., Ver., Oax.), Guat., Nic., C.R.; S.A. (Col., Ecu., Guy.); Antill., Trin. Chiapas Collections: *23227*; *29449*; *31871*; *32232*; *32424*; *33669*; *35234*.

Differs from *T. pyxidiferum* by the more slender character of the leaf, the straighter, more slender rachis, and the longer, more slender, tubular indusia with a suddenly flaring mouth; the rhizomes also seem more slender and less densely radiculose in *T. hymenophylloides*. In Chiapas, *T. hymenophylloides* often occurs at higher elevations than *T. pyxidiferum*.

Another very closely related species is *Trichomanes diaphanum* H.B.K., reported from Guat., Hond., Nic., C.R., and S.A. (Ven. and Col. to Peru, s Braz.). It seemingly differs in having stipes winged throughout, pinnae approximate to imbricate, more broadly winged rachis, and in greater number of sori per pinna.

10. **Trichomanes krausii** Hook. & Grev., Icon. Fil. 2:pl. 149. 1829 or 1830.

—*Didymoglossum krausii* (Hook. & Grev.) Presl, Hymenophyll. 23. "1843" [1844]. —Type: Dominica, *Kraus s.n.* (E).

Illustrations: Lindman, Ark. Bot. 1:23–25, 27, figs. 11–14. 1903; Fée, Mém. Fam. Foug. 11:pl. 28, fig. 3. 1866 [as *Didymoglossum fructuosum* Fée]; Wessels Boer (1962:312, fig. 29).

Fronds extremely variable, 2.5–4 (9) cm long with short stipe 0.5–1.5 cm long; blade pinnatifid or bipinnatifid nearly to rachis, wing of rachis hardly 1 mm broad; pinnae linear, 1 mm broad or less, unequal, separated by broad open sinuses with a large stellate hair on a tooth at the bottom; marginal hairs simple or in pairs; costules in the pinnae almost without connected sideveins, false veinlets partly parallel to margin; sori several, solitary in distal and terminal lobes; involucres partly immersed or at least winged, lips semiorbicular, broader than the tube and narrowly dark-edged (sometimes without dark edges); $n = 68$ (Jam.).

Epiphytic or occasionally on wet rocks, Lower Montane and Montane rain forests, Tropical Rain Forest, Pine-Oak-Liquidambar Forest; widely scattered in Sierra Madre, rare in Northern and Eastern highlands, n edge of Central Plateau; 300–1600 m. Southern Mex. (Tam., Ver., Pue., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Fr. Gui. and Bol., s Braz., ne Arg., Parag.); Antill., Trin. Chiapas Collections: *21788*; *22265*; *24073*; *24878*; *30186*; *32824*; *34276*.

Some of the specimens from the Sierra Madre are difficult to distinguish from *T. reptans* on the one hand and *T. hymenoides* on the other. I have not always been able to apply satisfactorily the key characters given by W. Boer (1962).

11. **Trichomanes ovale** (Fourn.) W. Boer, Acta Bot. Neerl. 11:296. 1962.

—*Didymoglossum ovale* Fourn., Bull. Soc. Bot. France 19:240. 1872. —Lectotype (chosen by W. Boer, 1962:296): Venezuela, Tovar, *Fendler 25* (P; isotypes B, G, GH, MO).

Illustrations: Lindman, Ark. Bot. 1:45. fig. 26. 1903 [as *Trichomanes fontanum* Lindman]; Wessels Boer (1962:290, figs. 15–16). 1962.

Fronds ± circular, obovate, or even lanceolate but always minute, 3–8 mm long, 2–4 mm wide; stipe 1–4 mm long; fertile fronds costate, the costa running to the single apical sorus, sterile fronds also with a costa or with fine flabellate venation; margin with thin, tan, geminate or stellate hairs; sori usually single, rarely two or three; involucre ± exserted, but lower part of tube always immersed, free part narrowly winged with stellate hairs and contracted at the mouth, or sometimes tube funnel-shaped; lips small and short, with few rows of brownish cells.

Epiphyte in Lower Montane Rain Forest; rare in Northern Highlands; 800 m. Southern Mex. (Chis. only), Guat., Hond., Nic., Pan.; S.A. (Ven., s Braz.); Gr. Antill. Chiapas Collection: *38177*.

12. **Trichomanes petersii** A. Gray, Amer. J. Sci. Arts (2)15:326. 1853.

—*Didymoglossum petersii* (A. Gray) Copel., Philipp. J. Sci. 67:78. 1938. —Type: Alabama, Hancock Co., near Sipsey River, *Peters s.n.* (not found in GH by W. Boer; topotypes collected by *Peters* in B, F, G, GH, K!, L, MO, U, UC!, US).

Trichomanes schaffneri Schlecht., Linnaea 26:368. "1853" [1854]. —Type: Mexico [Veracruz], Huatusco, *Schaffner s.n.* (B).

Illustrations: Hooker, Icon. Pl. 10:pl. 86. 1854; D. C. Eaton, Ferns N. Amer. 1:pl. 24, fig. 2. 1878; Slosson, Bull. Torrey Bot. Club 41:pl. 7, figs. 2–4. 1914; Wessels Boer (1962:290, fig. 9). 1962.

Fronds with stipe nearly as long as blade; blade ca. 1 cm long, 0.4 cm wide, ovate to oblong-lanceolate, apex rounded, base narrowly and abruptly decurrent, entire or sublobate; costa present, with a few, very oblique, parallel, usually unbranched side-veins and a number of nonconnected ones; marginal hairs geminate, sometimes simple or ternate hairs placed on small teeth; sorus solitary at end of costa; involucres wholly immersed, the tube cylindrical, abruptly and broadly expanded at apex, without lips and veinlets, not dark-edged, the rim ± irregulary lobed.

Walls of calcareous sinkholes; rare in Central Plateau; 2000 m. Southern Mex. (Pue., Ver., Oax.), Guat.; se U.S. Chiapas Collections: *X&S X-651* (US); *Sharp 45-1021* (MEXU, US).

13. **Trichomanes polypodioides** L., Sp. Pl. 2:1098. 1753.

—Type: "Habitat in India" [but the species as currently understood is American]; LINN 1253.2 is this species, but the specimen is identified as *Trichomanes crispum*. Proctor (Fl. L. Antill. 2:93. 1977) designated a specimen from Montserrat, *Proctor 19068(A)* as neotype.

Trichomanes sinuosum L. C. Richard ex Willd., L. Sp. Pl., ed. 4, 5:502. 1810. —Type: Guadeloupe, collector not stated, received from Richard (B—Herb. Willd. 20191).

Illustration: Vareschi, Fl. Venez. 1(1):pl. 47. 1969.

Rhizome long-creeping, ca. 0.3–0.5 mm diam.; fronds distant, mostly 6–15 (25) cm long, ca. 2 (3.5) cm broad, stipe short or nearly absent; blade linear, coarsely sinuate-lobate to pinnatifid, decurrent at base, with up to 20 pairs of highly variable, oblique lobes, these 3–7 mm broad, subentire to sinuate to coarsely crenate at the margin, rounded to truncate at the tip, pinnately veined; midribs and margins of blade with scattered, brownish, simple or 2–3-fid, sessile (or very short-stalked) hairs; leaf tissue membranous, glabrous; sori 1–3 per lobe, usually terminal, involucres immersed, salverform, with long-exserted receptacles; $n = 64$ (Trin.).

Epiphytic, usually on tree ferns, in Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest; uncommon, widely scattered in Northern and Eastern highlands, SE corner of Central Plateau; (300) 800–1300 m. Southern Mex. (Ver., Oax.), Bel., Guat., Hond., Nic., C.R.; S.A. (Ven. and Col. to Bol.); Antill., Trin. Chiapas Collections: *GM s.n.* (UC, US); *Dr 1603* (MEXU, US); *30907*; *31522*; *32121*.

14. **Trichomanes pyxidiferum** L., Sp. Pl. 2:1098. 1753.

—*Vandenboschia pyxidifera* (L.) Copel., Philipp. J. Sci. 67:53. 1938. —Type: based on Plumier's Tract. Fil. Amer. pl. 50E, 1705, and Petiver's Pter. Amer. pl. 13, fig. 13, 1712, illustrating a plant from Hispaniola.

Trichomanes cavifolium K. Müller, Bot. Zeitung (Berlin) 1854:753. —Type: Mexico, *Schiede s.n.*

Trichomanes junceum Christ, Bull. Herb. Boissier (2):4:944. 1904. —Type: Costa Rica, *Wercklé* (P!—4 sheets, one with locality "La Palma, 1600 m, 275a," the others *s.n.*).

Illustration: Slosson, Bull. Torrey Bot. Club 42:pl. 30. 1915.

Similar to *T. hymenophylloides,* but rhizome usually obscured by dense roots; blade more broadly ovate, pinnae subflabellate; ultimate segments to 1 mm broad or sometimes slightly more; leaf tissue firm, opaque, dark green; sori with funnelform involucres, not abruptly expanded at apex, ca. 1.5–2.0 mm long, to 1.2 mm broad at apex; $n = 36$ (O.W.).

Epiphytic or epipetric in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest; common in the Northern Highlands, scattered in the Sierra Madre, Eastern Highlands, E edge of Central Plateau; 600–1700 m. Southern Mex. (S.L.P., Ver., Oax.), Guat., Nic., C.R., Pan.; S.A. (Col., Ecu., s Braz.); Jam., Cuba, Hisp.; Afr. Chiapas Collections: *GM s.n.* (DS, P); *GM 176* (DS, P); *21633*; *21656*; *22163*; *22239*; *22388*; *22465*; *22466*; *24099*; *24963*; *25073*; *26285*; *27460*; *29859*; *30042*; *31227*; *31364*; *32528*; *32558*; *32610*; *32998*; *35189*; *35215*; *38178*.

15. **Trichomanes radicans** Swartz, J. Bot. (Schrader) 1800(2):97. "1801" [1802].

—*Vandenboschia radicans* (Swartz) Copel., Philipp. J. Sci. 67:51, 54. 1938. —Type: Based on Hedwig, Fil. Gen. et Sp. pl. 6 [*Trichomanes scandens* sensu Hedwig].

Trichomanes kunzeanum Hook., Sp. Fil. 1:127, pl. 39D. 1844. —Syntypes: Peru. Pangoa, *Mathews 1088* (K!); "Papayaco," *Poeppig s.n.* (K!); Venezuela, "Caraccas," *Linden 176* (presumably K, not seen; isosyntype BM!).

Trichomanes mexicanum v. d. Bosch, Ned. Kruidk. Arch. 5(2):164. 1861. —Syntypes: Mexico. *Schiede 806* (B); *Schaffner 7* (Herb. Fée, P?).

Illustrations: Knobloch & Correll, Ferns Chih. 44, figs. 1–2. 1962 (not typical of Chis. specimens); Vareschi, Fl. Venez. 1(1):pl. 49. 1969; Stolze, Fieldiana, Bot. 39:75, fig. 13, c. 1976.

Rhizome long-creeping, ca. 1–2 mm diam.; fronds distant, mostly 20–50 cm long, with stipe much shorter than blade, 1–12 cm long, greenish-alate upwards; blade deltoid to ovate, mostly 7–15 cm broad, 3–4-pinnatisect, rachis narrowly alate; pinnae ascending, lowermost often slightly reduced; ultimate segments close, linear-oblong, ca. 1 mm broad, often emarginate or bifid; leaf tissue membranous, glabrous, opaque, drying dark green or greenish black; sori with involucre narrowly cylindric, not or slightly expanded at apex, nearly free from leaf tissue or faintly greenish-marginate, with long-exserted receptacle; $n = 36$ (Jam., Chis.).

Epiphytic on tree trunks, infrequently on rocks or cliff faces, in Montane Rain Forest, infrequently Evergreen Cloud Forest; common in the Northern Highlands, Sierra Madre, scattered localities in the Central Plateau; 1000–2700 m. Southern Mex. (Chih., Hgo., Mlos., Pue., Ver., Jal., Gro., Oax.), Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol., Parag., s Braz.); Antill.; also w Eur., Afr., and Asia. Chiapas Collections: *R 853* (PH); *Mi 6966* (MEXU); *G 405* (BM, K, PH); *T&L 41671* (DS); *EM 185, 2369, 4270, 4438, 4326, 4898* (MEXU); *EM 5348* (MEXU, US); *P 6749* (BM, UC, US); *P 10353* (US); *P 10535* (UC, US); *GM s.n.* (UC); *GM 156* (DS); *15393*; *19945*; *21478*; *22664*; *23180*; *24925*; *24969*; *39454*; *30066*; *31330*; *31885*; *32198*; *32335*; *32592*; *33703*; *34688*; *38085*; *38838*; *42514*.

16. **Trichomanes reptans** Swartz, Prodr. Veg. Ind. Occ. 136. 1788.

—*Didymoglossum reptans* (Swartz) Presl, Hymenophyll. 23. "1843" [1844]. —Type: Jamaica, *Swartz s.n.* (S).

Illustrations: Hooker & Greville, Icon. Fil. 1:pl. 115. 1829 [as *Trichomanes quercifolium*]; Hooker, Icon. Pl. 2:pl. 187. 1837 [as *Trichomanes montanum* Hooker]; Wessels Boer (1962:312, fig. 28); Stolze, Fieldiana, Bot. 39:75, fig. 13, d–e. 1976.

Fronds irregular in outline, mostly 3–8 cm long, 1.5–3.5 cm broad, stipe to 1.5 cm long, upwards winged; blade lobed or pinnatifid, apex rather abrupt, distal part of blade often with irregular lobes to 2 cm long, lobes again cut into irregular segments; costules of lobes with many side-veins and non-connected false veinlets; marginal hairs simple or usually binate, stellate only in the sinuses, black, rather thick, arching or recurved; sori several in apical part of blade; involucres free and even short-stalked, rarely partly immersed or narrowly winged, with conspicuous, rounded, dark-edged lips; receptacles long-exserted.

Epiphytic on tree trunks, rarely on rocks, in Montane Rain Forest, infrequently Lower Montane Rain Forest, Evergreen Cloud Forest; locally common in the Northern Highlands, widely scattered in Central Plateau (especially SE corner), s Sierra Madre; 800–2200 m. Southern Mex. (Ver., Pue., Oax.), Guat., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to NW Arg., s Braz.); Jam., Hisp. Chiapas Collections: *G 611* (G, GH, PH); *GM 178* (DS); *22387,* pt.; *29821*; *30886*; *31521*; *32186*; *32608*; *32612*; *33104*; *33667*; *34383*; *35188*; *35214*; *38935*; *42555*.

17. **Trichomanes rigidum** Swartz, Prodr. Veg. Ind. Occ. 137. 1788.

—*Selenodesmium rigidum* (Swartz) Copel., Philipp. J. Sci. 67:81. 1938. —Type: Jamaica, *Swartz s.n.* (S?).

Illustrations: Raddi, Pl. Bras. 1:pl. 79, fig. 2. 1825 [as *T. mandioccanum* Raddi]; Presl, Epim. Bot. pl. 7. "1849" [1851] [as *T. daucoides* Presl].

Rhizome short-creeping to suberect, apex with lustrous, castaneous, septate hairs; fronds rigidly erect, caespitose, mostly 10–20 (30) cm long, stipe half to nearly equaling blade, not alate, brownish; blade deltoid-ovate, 3–4-pinnate; pinnae ascending, lowermost largest or nearly so; ultimate segments mostly 1–2.5 mm long, 0.3–0.5 mm broad, simple and bifid, acutish; leaf tissue hygroscopic, often revolute in drying, glabrous, dark green; sori subaxillary, involucres nearly free (greenish-marginate), funnelform, truncate and obscurely 2-lipped at apex, not expanded laterally; $n = 33$ (Jam.).

Terrestrial on wet banks in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands, 1350–1700 m. Southern Mex. (Oax.), Guat., Hond., Nic., C.R.; S.A. (Col. to Guy. and Bol., s Braz.); Antill.; Paleotropics. Chiapas Collections: *R 1047* (PH); *32413*; *32542*.

Species to Be Looked for in Chiapas

Trichomanes (sect. *Achomanes*) *crinitum* Swartz —Jam., Hisp., C.R., Pan., Col. Morton (1968:197) recognized this species as the type of the monotypic sect. *Ragatelus* (Presl) C. Chr., because of enlarged and darkened basal cells of the laminar hairs; however, not all specimens of *T. crinitum* show this character. The resemblance of some collections of *T. crinitum* to some specimens of *T. galeottii* (sect. *Achomanes*) is so close that I have had some trouble in distinguishing the two species. Because of this close relationship, I prefer to synonymize sect. *Ragatelus* under sect. *Achomanes*.

Trichomanes (sect. *Microgonium*) *ekmanii* W. Boer —Bel., Hond., Nic., Pan., S.A. (Col. and Ven. to Bol., N Braz.), Cuba, Hisp. Blade oblong, 1.5–3 cm long, 0.5–1.5 cm wide, with a roundish base; blade with a continuous submarginal false vein and without marginal hairs; cross-veins wanting; involucres wholly immersed, without lips and not dark-edged.

Trichomanes (sect. *Microgonium*) *godmanii* Hook. *in* Baker —Southern Mex. (Tab., Oax.), Bel., Guat., Hond., Nic., C.R., Pan., Cuba. Similar to *T. ekmanii* but with reticulate venation; well-developed fertile fronds ± orbicular.

Trichomanes (sect. *Lecanium*) *membranaceum* L. —Bel., Guat., Nic., C.R., Antill., Trin., S.A. (Col. and Ven. to Peru). Blade simple to slightly lobate; false veins present between the true veins; blade with paired, marginal, scalelike projections.

Trichomanes (sect. *Didymoglossum*) *punctatum* Poir. *in* Lam. ssp. *sphenoides* (Kunze) W. Boer —Guat., Nic., C.R., Pan., S.A. (Ven. and Col. to Bol.), Gr. Antill.; additional sspp. occur in Fla., P.R. and L. Antill., and C.R. to N Braz. Blade with flabellate venation; costae wholly wanting or not extending beyond the middle; marginal hairs stellate; sori few per blade (5–6), with involucres partly immersed.

Trichomanes (sect. *Lacostea*) *tuerckheimii* Christ —Southern Mex. (Ver.), Guat., Bel., Nic., C.R., S.A. (Col., Peru, Sur.). Rhizome long-creeping; fertile and sterile fronds not dimorphic; blade simply pinnate, not radicant; false veins absent; fronds not ciliate, the hairs of costae and stipes simple.

Trichomanes (sect. *Neurophyllum*) *pinnatum* Hedwig — Southern Mex. (Oax., Ver.), Guat., Bel., Nic., C.R., Pan.; S.A. (Col. to Bol. and Sur., Braz.); Antill., Trin. Rhizome suberect; fertile and sterile fronds similar in outline; blades simply pinnate, the sterile often radicant; dark cross-walls (false veins) perpendicular to the true veins present; fronds not ciliate.

101. VITTARIA

Vittaria J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:413. 1793. —Type: *Pteris lineata* L. [≡*Vittaria lineata* (L.) J. E. Smith].

Plants epiphytic; rhizome small, erect or short-creeping, scaley; scales dark, often iridescent, lanceolate, strongly clathrate; fronds clustered, linear, entire, with or without a short stipe; veins forming a single row of areoles between costa and the submarginal fertile vein, but immersed and so not readily seen; leaf tissue glabrous, subcoriaceous to coriaceous; sporangia borne in a continuous, ± sunken line along both sides of costa; exindusiate; paraphyses present, numerous in the submarginal soral groove, linear to clavate, multicellular; spores bilateral and monolete or tetrahedral and trilete, hyaline to usually yellowish when mature, without obvious perine; gametophytes filamentous; $x = 60$ (probably originally from $x = 30$).

Pantropical, with about 12 species in the Neotropics; a greater number of species is found in the Old World, but the exact number is uncertain because many are poorly defined (Copeland, 1947). Species of *Vittaria* grow at a wide range of elevations in the Neotropics, from near sea level to over 3000 m.

References: Benedict, R. C. 1914. A revision of the genus *Vittaria* J. E. Smith. I. The species of the subgenus *Radiovittaria*. Bull. Torrey Bot. Club 41:391–410; Tryon, R. 1964. Taxonomic fern notes. IV. Some American vittarioid ferns. Rhodora 66:110–117.

a. Spores bilateral, monolete; rhizome apex scales with a long, uniseriate tip; paraphyses slender, tan, without an enlarged apex; low elevation .... 3. *V. lineata*
aa. Spores tetrahedral, trilete; rhizome apex scales acute to acuminate, or with a short, uniseriate tip; paraphyses slender or with an enlarged apex, tan to reddish brown; low to high elevation.
  b. Blade 2.5–3.5 mm broad, flat, without strongly inrolled margins; fronds falcate, shorter than 20 (30) cm; low to middle elevation .... 1. *V. dimorpha*
  bb. Blade mostly 1–2 mm broad, with strongly inrolled margins; fronds straight to falcate, usually longer than 30 cm; middle to high elevation .... 2. *V. graminifolia*

1. Vittaria dimorpha K. Müller, Bot. Zeitung (Berlin) 1854:547, pl. 13, fig. 3.

—Syntypes: Mexico [Veracruz], *Schiede* [791?]; Mexico, *Leibold* [119?].

Illustration: only the original, of a scale.

Rhizome dorsiventral; rhizome apex scales with cells dimorphic, those of margin much thinner walled than those of central portion, apex acute or attenuate (not ending in a long, uniseriate tip), scales more obviously denticulate on margin and papillose on surface than in either *V. graminifolia* or *V. lineata*; fronds mostly 10–20 (30) cm long, often falcate; stipe pale, lighter in color than blades or drying the same color; blade mostly 2.5–3.5 mm broad; sporangia in shallow grooves back of flat (not inrolled) margin; midrib region of blade not greatly elevated and expanded laterally; paraphyses tan to reddish brown, with or without an enlarged apical cell; spores tetrahedral, trilete.

Epiphytic in Lower Montane and Montane rain forests; scattered in Eastern and Northern highlands (but not Jitotol Ridge), Central Plateau; 700–1300 m. Southern Mex. (Ver., Oax.), Guat., and probably further south. Chiapas Collections: *GM 47* (DS); *Dr 1601* (MEXU, NY, US); *21674*; *22498*; *29912*?; *31523*; *31536*; *32266*; *32928*; *35200*; *38035*.

I am uncertain as to the applicability of the name *V. dimorpha* to Chiapas collections. Apparently, no one has recently studied type material. *Vittaria dimorpha* was established on the basis of two kinds of cells in the rhizome scales; unfortunately, other species of *Vittaria* appear to have rhizome scales with this tendency, e.g., some collections of *V. graminifolia*. The most usable character by which to recognize Chiapas collections is the flat, relatively wide blades without inrolled margins; also the midrib region seems decidedly different than in *V. graminifolia*. I have considered that this blade form might be merely a juvenile character; however, all collections with this blade type have been made at relatively low elevations, and *V. graminifolia* and *V. dimorpha* appear to grow together only occasionally. In sum, *V. dimorpha* (or what I have called that species in Chiapas) seems at least as distinct from the two other Chiapas species as they are from each other.

2. **Vittaria graminifolia** Kaulf., Enum. Fil. 192. 1824.

—Type: Brazil, sent to Kaulfuss by *Otto* (LZ, destroyed; isotype E).

Vittaria filifolia Fée, Mém. Fam. Foug. 3:20, pl. 3, fig. 6. 1852. —Lectotype (chosen by Tryon, 1964:114): Guadeloupe, *L'Herminier s.n.* (P–CO).

Illustrations: **Fig. 51**; Tryon, Contr. Gray Herb. 194:214. 1964.

Rhizome dorsiventral; rhizome apex scales with cells slightly dimorphous, those of margin thinner walled than those of middle, apex attenuate, not ending in a long, uniseriate tip; fronds ca. (10) 25–50 cm long, pendent; stipe pale, lighter in color than blades or drying the same color as blade; blade mostly 1–2 mm broad; sporangia in deep grooves close to the inrolled margin; midrib region of blades elevated and with 2 lateral flanges that protrude over the soral grooves; paraphyses reddish brown, usually with an enlarged, clavate apical cell; spores tetrahedral, trilete; n = ca. 120 (source unknown).

Epiphytic in Montane Rain Forest, Evergreen Cloud Forest, Pine-Oak-Liquidambar Forest, rarely Seasonal Evergreen Forest; common in Central Plateau, Sierra Madre, Northern Highlands; (800) 1300–3000 m. Southern Mex. (Jal., Mlos., Oax., Hgo., Ver.), Guat., Salv., Nic., C.R., Pan.; S.A. (Col. to Bol., s Braz., Urug.); Antill. Chiapas Collections: *Z 72, 388* (DS); *C 322* (DS); *Ti 636-13* (DS, US); *GM 92* (DS, US); *T&L 40312* (DS); *JTM 1232* (US); *EM 5239* (MEXU, US); *L&S 9929* (US); *X&S X-432* (US); *P 6731* (NY, UC, US); *P 10099* (UC, US); *G 255* (K, NY); *G 270* (K, PH); *P 23* (US); *R 1052* (PH); *EM 884, 215, 2878* (MEXU, US); *We 11712* (MEXU); *15363*; *21124*; *21504*; *21803*; *21868*; *21919*; *21987*; *22102*; *22666*; *22752*; *23218*; *24967*; *25389*; *26816*; *30085*; *30136*; *31805*; *31979*; *32048*; *32133*; *32181*; *32265*; *32453*; *33675*.

An additional synonym is possibly *V. scabrida* Klotzsch ex Fée, syntypes from Brazil (*Sellow s.n.*) and Mexico (*Schiede s.n.*).

3. **Vittaria lineata** (L.) J. E. Smith, Mém, Acad. Roy. Sci. (Turin) 5:421. 1793.

—*Pteris lineata* L., Sp. Pl. 2:1073. 1753. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:374. 1977): Plumier's Descr. Pl. Amer. pl. 41, 1693 (=Tract. Fil. Amer. pl. 143, 1705), illustrating a plant from near Port de Paix, Haiti.

Illustrations: Tryon, Contr. Gray Herb. 194:214. 1964: Eaton, Ferns N. Amer. 1:pl. 38. 1879; Proctor, Fl. L. Antill. 2:375. 1977.

Rhizome dorsiventral; rhizome apex scales with cells uniformly thick-walled, the scales ending in a long, filiform, uniseriate tip; fronds ca. (10) 25–75 (100) cm long, pendent; stipe pale, lighter in color than blade or drying the same color as blade; blade mostly 1.5–3.0 mm broad; sporangia in grooves just back from margin; paraphyses tan to light reddish brown, linear, apical cell not or only slightly enlarged; spores bilateral, monolete.

Epiphytic in Tropical Rain Forest, often on palm trunks; rare in Eastern Highlands near Guatemala border; 350 m. Southern Mex. (S.L.P., Ver.?, Tab.), Bel., Guat., Hond., Nic., C.R.; S.A. (Col. to Bol., Braz., Urug.); Fla., Antill., Trin. Chiapas Collection: *33174*.

Most reports of this species in Mexico are based on misidentifications of *V. graminifolia*, which is much more common in our area than *V. lineata*. In fact, the two are confused throughout their ranges, so that their exact distributions are uncertain. In Chiapas (and probably Mexico in general) *V. lineata* grows at very low elevations, while *V. graminifolia* is found at middle to high elevations.

Species to Be Looked for in Chiapas

Vittaria stipitata Kunze —Guat., Nic., C.R., Pan., S.A. (Ven. and Col. to Bol., Braz.), Gr. Antill. Distinguished from the known Chiapas species by the dark, reddish brown to atropurpureous, terete stipe, the radial, suberect stem, and the somewhat broader blade (3–5 mm).

Hecistopteris pumila (Spreng.) J. Smith —Oax. (Mickel, pers. comm.), Bel., Guat., Hond., Nic., C.R., Pan., S.A. (Col. to Sur. and Peru, Braz.); Antill., Trin. A monotypic Neotropical genus closely allied to *Vittaria*, differing by the small (usually less than 2 cm long), flabellate, furcate blade and superficial sporangia (borne along distal portion of the veins). To be expected in Chiapas at lower elevations of the Northern and Eastern highlands.

102. WOODSIA

Woodsia R. Brown, Prodr. Fl. Nov. Holl. 158. Obs. 4. 1810. —Type: *Woodsia ilvensis* (L.) R. Brown [≡*Acrostichum ilvense* L.].

Fronds tufted, numerous, with usually many dead stipes or stipe bases; rhizome scaly, short, horizontal to obliquely erect; fronds ovate to linear-lanceolate, to 60 cm long, 12 cm broad; stipe stramineous to dark purple, usually dark at the base and lighter distally, 0.5–3 mm diam., with 2 crescent-shaped vascular bundles at the base, adaxially sulcate, sometimes obliquely articulate at insertion of first pinna pair or along stipe; pinnae usually numerous, lower and middle ones stalked to adnate, simple to pinnate, suborbicular to oblong-lanceolate, to 9 cm long, 3.5 cm broad, tips of pinnae acute to rounded, margins entire to pinnate; venation free; sori discrete, medial to submarginal, glandular to eglandular; indusia basal, composed of individual hairs or scalelike structures, or cuplike to globose; spores bilateral, monolete, with a verrucose, rugose, or reticulate perispore; gametophytes cordate, the margins and surface glandular; $x = 33, 38, 39, 41$.

Small to medium-sized ferns of rocks, cliffs, talus slopes, and embankments. Brown (1964) recognized 22 species in the genus, only one of which occurs in Chiapas. *Woodsia* is essentially cosmopolitan, occurring on all continents except Australia and Antarctica; the greatest number of species is in temperate or high mountain regions of Asia and North America.

REFERENCE: BROWN, D. F. M. 1964. A monographic study of the fern genus *Woodsia*. Beih. Nova Hedwigia 16:1–154.

1. **Woodsia mollis** (Kaulf.) J. Smith, J. Bot. 4:191. 1841.

—*Physematium molle* Kaulf., Flora 12:341. 1829. —TYPE: Mexico, collector not stated.

Cheilanthes canescens Kunze, Linnaea 13:143. 1839. —SYNTYPES: Mexico. "ad Polverillos," *Schiede s.n.*; "ad San Pedro y San Pablo," *Ehrenberg s.n.* (presumably LZ—destroyed).

Woodsia guatemalensis W. J. Hooker, Sp. Fil. 1:61, pl. 21A. 1844. —TYPE: Guatemala, *Skinner s.n.* (K!).

Woodsia fragilis Liebm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5)1:280. 1849. —LECTOTYPE (chosen by Brown, 1964): Mexico, Veracruz, Pico de Orizaba above Santa María Alpatlahua, *Liebmann* [Liebm. Pl. Mex. 2606, Fl. Mex. 502] (C!); isolectotypes: C! (Liebm. Pl. Mex. 2606, Fl. Mex. 503), K!

ILLUSTRATIONS: **Fig. 69**; Knobloch & Correll, Ferns Chih. pl. 49. 1962; Rovirosa, Pterid. Sur Mex. pl. 4. 1909; Kunze, Anal. Pterid. pl. 27. 1837.

Rhizome with persistent stipe bases, short, horizontal to obliquely erect, 1.5–5 cm long, 0.5–0.7 cm diam.; rhizome scales 5–7 mm long, 0.5–1.5 mm broad near base, tan to brown, with a darkened center; fronds 3–13 photosynthetic ones, oblong-lanceolate to elliptic, (6) 16–60 cm long, 1.5–7 (12) cm broad; stipe not articulate, stramineous, shiny, sparingly pubescent and scaly, 1.5–3 mm diam., 1–8 (11) cm long; pinnae (12) 20–55 pairs, sessile, lanceolate to oblong-lanceolate, deeply pinnatifid to pinnate, not prominently auricled, gradually reduced in lower third or half of blade, pinna margins slightly crenate, tips obtuse, glandular at the margin; middle pinnae 1–6 cm long, 0.5–2 cm broad; leaf tissue chartaceous to coriaceous, bearing glands and long septate hairs, especially abaxially; indusia tan, ± globose and glandular; spores 32 per sporangium.

Rocky cliffs and embankments adjacent to Montane Rain Forest, Pine-Oak-Liquidambar Forest, Tropical Deciduous Forest, Evergreen Cloud Forest; common in Sierra Madre, uncommon in Central Plateau; 700–3500 m. Nearly throughout Mex. (Baja C.S., Chih., Dgo., Sin., Nay., Jal., Tlax., S.L.P., Hgo., Gto., Méx., D.F., Gro., Mich., Mlos., Pue., Oax., Ver.), Guat., Nic. CHIAPAS COLLECTIONS: *G 231* (K, NY, PH); *GM s.n.* (DS); *GM 23* (DS); *P 7237* (NY, UC, US); *EM 2447* (K, MEXU, NY, US); *EM 4605* (DS, MEXU, MICH, US); *JTM 1218* (US); *21745*; *22581*; *22682*; *29411*; *29438*; *31856*; *40112*; *40216*; *40348*.

103. WOODWARDIA

Woodwardia J. E. Smith, Mém. Acad. Roy. Sci. (Turin) 5:411. 1793. —LECTOTYPE (first chosen by J. Smith?, Hist. Fil. 310. 1875): *Woodwardia radicans* (L.) J. E. Smith [≡*Blechnum radicans* L.].

Anchistea Presl, Epim. Bot. 71. "1849" [1851]. —TYPE: *Anchistea virginica* (L.) Presl [≡*Blechnum virginicum* L.].

Plants terrestrial; rhizome commonly ascending to erect, creeping in a few species, stout and densely scaly at apex, dictyostelic; stipe at the base with numerous vascular bundles in cross section; fronds monomorphic, commonly bipinnatifid, firm in texture, margin entire to serrulate to spinulose; veins anastomosing to form costal and costular areoles, beyond that free or forming additional areoles; sori borne on outer side of costular (or costal, or both) areoles, superficial to deeply impressed, the linear indusia opening toward the costule; spores bilateral, monolete, smooth or flocculose; $x = 34, 35$.

About 10 species, in E Asia and Himalayas (ca. 5 spp.), Atlantic islands, Canada and United States (2 spp.) through Mexico (3 spp.) to Nicaragua (1 sp.). As Copeland (1947) and others have pointed out, *Woodwardia* has a Northern Hemisphere distribution, with most species in temperate regions or high elevations in the tropics. It is generally regarded as having affinities to *Blechnum*.

REFERENCE: MAXON, W. R. 1919. Notes on American ferns—XIV. Amer. Fern J. 9:67–73.

1. **Woodwardia spinulosa** Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):64. 1842.

—TYPE: Mexico, Veracruz, *Galeotti 6255* (BR).

ILLUSTRATIONS: **Fig. 81**; Matuda, Anales Inst. Biol. Univ. Nac. México 27:137. 1956 [as *Woodwardia radicans*]; Rovirosa, Pterid. Sur Mex. pl. 24. 1909 [as *W. radicans*].

Rhizome suberect to erect, apex with light to dark brown lanceolate-attenuate scales 2–4 cm long (these also at stipe base); blade large, mostly 1–2 m long, stipe about half blade length; stipe blackish at base, stramineous distally, to 1 cm diam.; blade pinnate-pinnatifid, with pinnae mostly 4–10 cm broad, often conduplicately folded with segments drooping; rachis without buds; segments lanceolate, often falcate, oblique, acute at tip, spinulose at the margin, especially toward tip, larger segments to 1 cm broad, sometimes crenately lobed on acroscopic side; costae, veins, and leaf tissue below with scattered, tan, fibrillose scales, these often deciduous; sori along only the costular areoles (rarely also along costal areoles), mostly 2–3 mm long, impressed, upper surface thus embossed.

Steep banks adjacent to Montane Rain Forest, Evergreen

Cloud Forest, Pine-Oak Forest; locally common in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1700–2800 m. Mexico (Dgo., Sin., Son., Jal., Mich., Tam., Hgo., Mlos., Méx., Gro., Oax., Pue., Ver.), Guat., Salv., Hond., Nic. CHIAPAS COLLECTIONS: *GM 34* (DS); *La 161* (DS); *R&B 19799* (DS); *EM 5383* (MEXU, US); *R&R&M 1161* (US); *JTM 1233* (US); *S&S 2278* (US); *G 211* (NY, PH); *A 1236* (UC); *MC 1584* (US); *L&S 9869* (US); *6657*; *9359*; *12967*; *15254*; *22000*; *22401*; *23294*; *27214*; *31933*; *32075*; *32350*; *33609*; *40847*; *42774*.

I tentatively place here *Rovirosa 1068* (PH!), collected near Gracias a Dios, 1800 m, in the Northern Highlands. It is very atypical in having intercostular sori and thus tends toward *W. martinezii* Maxon, known only from Hidalgo. A specimen from Veracruz (*C. L. Smith 2154,* UC) matches the Rovirosa collection. These two collections may represent an undescribed species, but the material at hand is too scant to be certain.

KEY TO GENERA OF CHIAPAS FERN ALLIES

1. Stem and branches conspicuously grooved, siliceous, hollow; leaves in whorls of 10–15, forming sheaths at nodes, sporangia on inner side of stalked, peltate scales .... 104. *Equisetum*

1. Stem and branches not conspicuously grooved or siliceous, not hollow; leaves not whorled, not forming sheaths at nodes, sporangia axillary 2

2(1). Leaves inconspicuous, sometimes bifid; stems naked, dichotomously branched; sporangia trilocular; plants rootless .... 107. *Psilotum*

2. Leaves conspicuous, not bifid; stems foliose, variously branched; sporangia unilocular; plants with roots 3

3(2). Leaves more than 3 cm long, rushlike, arising from a short, cormlike stem; plants aquatic .... 105. *Isoëtes*

3. Leaves less than 3 cm long, not rushlike, arising from elongate stems; plants terrestrial or epiphytic 4

4(3). Strobili quadrangular; sterile leaves broad, often membranaceous, usually dimorphic; plants heterosporous; habitat terrestrial or on rocks .... 108. *Selaginella*

4. Strobili, if present, usually terete; leaves acicular to broad, often coriaceous, usually monomorphic; plants homosporous; habitat epiphytic or a few species terrestrial .... 106. *Lycopodium*

104. EQUISETUM

Equisetum L., Sp. Pl. 2:1061. 1753. —LECTOTYPE (chosen by Farwell, Mem. New York Bot. Gard. 6:464. 1916): *Equisetum arvense* L. *Equisetum fluviatile* is sometimes regarded as lectotype; see discussion by Pichi Sermolli, Webbia 26:179, 1971.

For additional synonymy, see Pichi Sermolli, Webbia 26:179. 1971.

Plants terrestrial, rushlike, with subterranean, wide-creeping, branching, dark-colored, perennial rhizomes; aerial stems perennial or annual, either all alike and green or dimorphic with the fertile stems lacking chlorophyll, cylindric, fluted, stout or slender, jointed, simple or with whorls of branches at the solid nodes, with usually hollow internodes, often roughened by a coating of silica; stomata arranged in regular rows or in broad bands in the grooves; stem leaves reduced, united laterally to form sheaths at the nodes; sporophylls modified into stalked peltate scales, aggregated into a cone or strobilis at summit of main stem or at apex of branches; sporangia 6 or 7 under each scale, opening on inner side; spores all alike, greenish, each encircled by four hygroscopic bands (elators); prothallia on the ground, green, monoecious or dioecious; $x = 108$.

Plants of usually wet habitats, or sometimes in well-drained soils, reproducing extensively by branched rhizomes. Many of the species have extremely wide distributions, and the genus as a whole is subcosmopolitan. About 25 species are recognized, and these are usually placed in two subgenera: subg. *Equisetum,* with stomata flush with the epidermis, dimorphic aerial stems, and fertile stems nonchlorophyllous and ephemeral; and subg. *Hippochaete* (Milde) Baker, with sunken stomata and monomorphic, green, persistent stems. All three species in Chiapas fall within the latter subgenus.

REFERENCE: HAUKE, R. L. 1963. A taxonomic monograph of the genus *Equisetum* subgenus *Hippochaete.* Beih. Nova Hedwigia 8:1–123.

a. Stems branched at the nodes; stomata in bands of two or more lines or in single lines; sheaths without black girdles.

  b. Stomata in bands of two or more lines; individual endodermis around each vascular bundle; tubercles on ridges appearing square or flat in profile .... 1. *E. giganteum*

  bb. Stomata in single lines; double common endodermises around vascular bundles; tubercles on ridges resembling saw-teeth in profile .... 3. *E. myriochaetum*

aa. Stems simple, not ordinarily branched at nodes (browsed stems may be branched); stomata in one line; sheaths with black girdles, white above; individual endodermis around each vascular bundle .... 2. *E. hyemale* var. *affine*

1. **Equisetum giganteum** L., Sp. Pl., ed. 2, 2:1517. 1763.

—Type: based on Plumier's Plant. Amer. ed. Burm. (Plum. hist. mss.) 2:pl. 125, fig. 2, 1757, illustrating a plant from Jamaica.

For additional synonymy, see Hauke (1963:49).

Illustrations: Vareschi, Fl. Venez. 1(1):118, pl. 26. 1969; Hauke (1963:pls. 1, 3); Hooker, Second Cent. Ferns pl. 74. 1861.

Stems with regular whorls of branches, evergreen, to 5 m tall, 3.5–24 mm diam., with 16–56 ridges; stomata in bands of (2) 3–4 (5); cross section of stem with a separate endodermis around each vascular bundle, carinal collenchyma extending to the vascular bundle or nearly so, vallecular collenchyma quite variable, from nearly absent to extending to the vascular bundle; ratio of vallecular to carinal collencyma (0.67) 0.50–0.33 (0.17); sheaths light brown, usually about as wide as long, 8–20 mm long, 6–23 mm wide; branches 8–10-angled, rough, the ridges adorned with tubercles appearing square or flattened in profile; cones occasionally at apex of young stems, 25 mm long, 8 mm diam., frequently present on apex of branches, small, ca. 15 mm long, 5 mm diam., with a distinct apiculum ca. 0.5 mm long; spores well-formed.

Not yet known from Chiapas (or Mexico), but to be looked for. Reported by Hauke (1963) from Guat., Salv., C.R., Pan.; S.A. (Col. and Ven. to s Braz., cen. Chile, and Arg.); Gr. Antill.

2. **Equisetum hyemale** L. var. **affine** (Engelm.) A. A. Eaton, Fern Bull. 11:111. 1903.

—*Equisetum robustum* Engelm. var. *affine* Engelm., Amer. J. Sci. Arts 46:88. 1844. —Type: banks of Mississippi River below Jefferson Barracks (near St. Louis), *Engelmann s.n.* (MO; isotype US).

Equisetum robustum A. Br. ex Engelm., Amer. J. Sci. Arts 46:88. 1844. —Syntypes: several collections cited from eastern United States; also two collections from Asia.

For additional synonymy, see Hauke (1963:73).

Illustration: Knobloch & Correll, Ferns Chih. 35. 1962.

Stems normally unbranched, upright; 1.8–22.4 dm tall, 2.5–17.5 mm diam., with 14–50 ridges, the ridges convex to furrowed; stomata in single files, one on each side of the groove; cross section of stem with carinal collenchyma extending to the vascular bundle, vallecular collenchyma absent or small; double endodermis present; sheath when young same color as stem, but soon developing a dark brown to black girdle around the middle, with the portion of the sheath above the girdle becoming tan, white, or ashy gray, constricted at base; branches found only on old or injured stems, frequently arising from top of previous year's stems and bearing cones, smaller than main stems but similar; cones yellow to black with a prominent black apiculum; $2n = 216$ (Can.).

Slopes, creek banks, and moist pastures, sometimes adjacent to Pine-Oak-Liquidambar Forest; scattered and rather uncommon in Northern Highlands (Jitotol Ridge), Central Plateau; 1700–2700 m. Widespread, from Alas. and Can., through U.S. and Mex. (Baja C.S., Chih., N.L., Son., Méx.) to Guat.; e Asia. Chiapas Collections: *L&S 9911* (UC, US); *L&S 9956* (US); *La 2046* (DS); *T 1284* (DS); *6046*; *6920*; *12723*; *21386A*; *42887*.

Hybrids between *E. hyemale* and *E. myriochaetum* occur from Nuevo León and Jalisco south to Guatemala (Hauke, 1963). This hybrid has been collected once in Chiapas: south of the center of Amatenango del Valle, 1800 m, *Ton 1095* (DS, US). The hybrid has malformed spores (seen in the Chiapas specimen) and intermediate morphology.

Equisetum hyemale var. *hyemale* is confined to Iceland, Europe, and western Asia.

3. **Equisetum myriochaetum** Schlecht. & Cham., Linnaea 5:623. 1830.

—Type: Mexico, Veracruz, Misantla, *Schiede & Deppe 833* (isotype B).

For additional synonymy, see Hauke (1963:63).

Illustrations: Hauke (1963:pl. 1); Sadebeck, Nat. Pflanzenfam. 1(4): 547. 1900.

Stems with regular whorls of branches, evergreen, to 8 m tall, 6–18 mm diam., with 16–48 ridges, mostly smooth or only slightly roughened, stomata in one line on each side of the groove; cross section of stem with both carinal and vallecular collenchyma well developed, the former usually extending to the vascular bundle, the latter to the vallecular canal, ratio of vallecular to carinal collenchyma varying from 0.5–1; endodermis double; sheaths same color as stem, 7–21 mm long, 5–20 mm wide, the ratio 0.9–2.0; teeth usually thin and brown to white, drying and breaking off to produce a clipped appearance at top of sheath, or mostly persistent; branches with 6–8 ridges, borne in regular whorls from all but the lower 2–3 nodes, the ridges bearing tubercles that, viewed from side, resemble saw-teeth, pointing apically; cones borne terminally on stem and branches, the stem cone up to 30 mm long, 12 mm diam., the branch cones to 10 mm long, 4 mm diam.; cones blunt, or the branch cones frequently apiculate.

Slopes, in marshes, and along streams, generally in clearings of Pine-Oak-Liquidambar Forest, Montane Rain Forest, less often Tropical Rain Forest, Seasonal Evergreen Forest, Pine-Oak Forest; common in Central Plateau and Northern Highlands (especially Jitotol Ridge), uncommon or rare in Sierra Madre, Eastern Highlands, Central Depression; (350) 900–1800 (2400) m. Southern Mex. (Hgo., S.L.P., Ver., Gro., Oax.), Guat., Hond., C.R.; S.A. (Col. to Peru). Chiapas Collections: *C 287* (DS); *EL 5310* (DS); *La 546* (DS); *T 117, 755, 1651, 1788* (DS); *R&B 19843* (DS, US); *EM 2780* (MEXU, US); *EM 5057* (MEXU, US); *T&L 41213* (DS); *RMK 2784* (DS, UC, US); *MC 1839* (UC); *R&R&M 1251* (US); *R 902* (PH); *6337*; *6350*; *7548*; *7717*; *11985*; *12724*; *14817*; *16128*; *19889*; *19890*; *21386*; *31283*; *32450*; *32451*; *32464*; *32741*; *33262*; *33813*; *34581*; *35252*; *37812*; *39552*; *42095*; *42886*.

Hybrids between *Equisetum giganteum* and *E. myriochaetum* (*E.* × *schaffneri* Milde) were said by Hauke (1963) to occur from southern Mexico (Oax., Ver.), through Central America, to Venezuela and Peru. The Mexican and Venezuelan records are remarkable because one of the parents, *E. giganteum*, has not been collected in those countries. Hauke (1963) suggested that perhaps an occasional spore of the hybrid might be viable and capable of establishing at some distance from the parents. *Equisetum* × *schaffneri* can be distinguished by having abortive spores, individual endodermises, sawtooth ridges on the stems, and intermediacy in number of rows of stomata. This hybrid has not yet been collected in Chiapas but may occur there.

105. ISOËTES

Isoëtes L., Sp. Pl. 2:1100. 1753. —Type: *Isoëtes lacustris* L.
For additional synonymy, see Pichi Sermolli, Webbia 26:175. 1971.

Perennial aquatic, amphibious, or terrestrial grasslike plants with short, unbranched, 2- or 3-lobed, subterranean, cormlike axis that produces numerous roots and a tuft of erect or recurved rushlike leaves (rarely with creeping rhizome); leaves with transversely septate, longitudinal air-channels, bearing a small triangular ligule on the inner (adaxial) surface just above the sporangium; sporangia one per leaf, of two kinds, sunken in chambers at the enlarged leaf bases, ± covered by a membranous velum on the inner face; microsporangia producing numerous minute oval microspores, these germinating into prothallia bearing a solitary antheridium; megasporangia producing few, large, spherical megaspores, these with a trilete scar, germinating into prothallia bearing only archegonia; $x = 11$.

A subcosmopolitan genus with perhaps as many as 100 species, but the number is uncertain because of the difficulty in defining limits of variation and the paucity of easily studied characters in the genus. Traditionally, spore characters, and to a lesser extent corm and leaf characters (presence or absence of stomata, peripheral strands), have been used to distinguish species. In Chiapas a single species is known.

Isoëtes and *Stylites,* a recently described relative from Peru, comprise the isolated family Isoëtaceae. The affinities of the family are not well understood.

Reference: Pfeiffer, N. E. 1922. Monograph of the Isoetaceae. Ann. Missouri Bot. Gard. 9:79–232.

1. Isoëtes pringlei Underw., Zoe 1:98. 1890.
—Type: Mexico, Jalisco, near Guadalajara, *Pringle 3333* (NY; isotypes GH, IJ, MO, UC!, US).
Illustration: none found.

Corm 2-lobed; leaves numerous, to 35 cm long, firm, tapering, with membranaceous margin only slightly extended above level of sporangium; stomata abundant; peripheral strands numerous, 6 conspicuous and 6–10 accessory groups; ligule triangular, short and wide; sporangia large, to 12 mm long, partly covered by a narrow velum; megaspores chalky white when dry, 460–550 μm in diam., marked with high tubercles, occasionally extended into short rounded crests; microspores fawn-colored, 35–42 μm long, sometimes showing tendency toward a winged condition.

Ponds and grassy springy areas, uncommon; Central Plateau; 2300–2800 m. Southern Mex. (Jal.). Chiapas Collections: *15070*; *20424*.

Species to Be Looked for in Chiapas

Isoëtes cubana Engelm. —Cuba, Bel. Megaspores with large, round, depressed tubercles; stomata rare, chiefly near leaf tips. Pine woodlands; low-elevation pine woodlands have not yet been found in Chiapas.

Isoëtes mexicana Underw. —Chih., Hgo., Méx., Mlos., Jal., Mich. Megaspores smooth or with low tubercles, somewhat smaller than in *I. pringlei* (320–460 μm).

106. LYCOPODIUM

Lycopodium L., Sp. Pl. 2:1100. 1753. —Lectotype (first chosen by Britton & Brown, Ill. Fl. N. United States, ed. 2, 1:43. 1913): *Lycopodium clavatum* L.

Lycopodium subg. *Urostachya* Pritzel *in* Engler & Prantl, Nat. Pflanzenfam. 1(4):592. 1900. —*Urostachys* (Pritzel) Herter, Beih. Bot. Centralbl. 39 (Abt. 2):249. 1922. —Lectotype (chosen by Rothmaler, Feddes Repert. Spec. Nov. Regni Veg. 54:58. 1944): *Lycopodium selago* L. [≡*Urostachys selago* (L.) Herter]. I follow Proctor (1977) in adopting the original spelling *Urostachya* as a subgeneric name, but accept the altered spelling *Urostachys* at generic rank; this conforms with Art. 20 of the International Code of Botanical Nomenclature, which specifies that generic names must be singular number.

For additional synonymy and typification, see Pichi Sermolli (Webbia 26:137–157. 1971).

Plants terrestrial or epiphytic; habit trailing, erect or pendent; stems simple to much-branched, clothed with numerous, small, simple, 1-nerved leaves, these all similar or in some species dimorphous, arranged in 4 to numerous ranks; sporophylls like other leaves or modified (usually smaller), sometimes aggregated to form compact cones (strobili); sporangia axillary, 1-loculed; spores all alike (homosporous), globose to tetrahedral with a trilete scar; gametophytes fleshy or tuberous, with or without chlorophyll, monoecious; $x = 23, 34, 39, 104$.

As construed in a broad sense, a genus comprising 400 or more species, the majority in tropical regions at middle to high elevations, but also numerous species in temperate regions. Eighteen species are known from Chiapas and also Mexico. In contrast to *Selaginella,* most Mexican species of *Lycopodium* seem to be rather widespread. The largest concentration of lycopodiums in the New World occurs in Andean regions.

Many authorities divide *Lycopodium* s.l. into several genera, under such names as *Diphasium,* *Huperzia* (≡*Urostachys*), *Lycopodiella,* and *Lycopodium* s.s. In the broad sense, *Lycopodium* is indeed a diverse genus, and a case can be made on the basis of morphological (Øllgaard, 1975, 1979), cytological, and palynological (Wilce, 1972) evidence for recognizing several segregates, either as genera or subgenera. However, authorities are not yet agreed on circumscriptions of the various segregates. For floristic purposes, I prefer an inclusive genus *Lycopodium*; subgenera, according to Wilce (1972), are indicated parenthetically.

I thank Benjamin Øllgaard for advice on certain nomenclatural matters; the taxonomic opinions expressed are my own.

REFERENCES: UNDERWOOD, L. M., AND F. E. LLOYD. 1906. The species of *Lycopodium* of the American tropics. Bull. Torrey Bot. Club 33:101–124; NESSEL, H. 1939. Die Bärlappgewächse. 404 pp., 87 figs.; WILCE, J. 1965. Section *Complanata* of the genus *Lycopodium*. Beih. Nova Hedwigia 19:i–x, 1–233; 1972. Lycopod spores, I. General spore patterns and the generic segregates of *Lycopodium*. Amer. Fern J. 62:65–79; ØLLGAARD, B. 1975. Studies in Lycopodiaceae, I. Observations on the structure of the sporangium wall. Amer. Fern J. 65:19–27; 1979. Studies in Lycopodiaceae, II. The branching patterns and infrageneric groups of *Lycopodium* sensu lato. Amer. Fern J. 69:49–61; BEITEL, J. 1979. Clubmosses (*Lycopodium*) in North America. Bull. Amer. Fern Soc. (Fiddlehead Forum) 6(5):1–8.

- a. Plants epiphytic; coneless; spores with foveolate (pitted) to fossulate (shallowly grooved) ornamentation.
  - b. Stem with leaves strongly dorsiventrally arranged; leaves 4-ranked.
    - c. Sporophylls greatly reduced .... 15. *L. skutchii*
    - cc. Sporophylls not greatly reduced.
      - d. Stems near base ca. 2 mm diam. or more; stems forking about every 5 cm.
        - e. Sporophylls less than 0.75 mm broad and 8 mm long; stems 5–6 times dichotomous, lower forks forming nearly 90° angles; oldest leaves often deciduous .... 2. *L. bradeorum*
        - ee. Sporophylls greater than 0.75 mm broad and 8 mm long; stems 1–4 times dichotomous, lower forks forming angles of 45° or less; oldest leaves not deciduous .... 11. *L. orizabae*
      - dd. Stems near base ca. 1 mm diam. or less; stems forking about every 10 cm.
        - f. Stem stramineous to greenish .... 9. *L. linifolium*
        - ff. Stem reddish .... 7. *L. guatemalense*
  - bb. Stem with leaves radially arranged or weakly dorsiventrally arranged (*L. taxifolium*).
    - g. Leaves 4-ranked; branches (stem plus leaves) less than 5 mm wide.
      - h. Branches filamentous, the stems and leaves less than 1.5 mm diam.; sporophylls lanceolate; oldest leaves appressed .... 18. *L. tuerckheimii*
      - hh. Branches usually greater than 1.5 mm diam.; sporophylls usually ovate; oldest leaves spreading .... 13. *L. pringlei*
    - gg. Leaves 8-ranked or more; stem and leaves more than 5 mm wide.
      - i. Leaves linear-lanceolate.
        - j. Leaves rather sharply deflexed from near the base; stem stout, 2–4 mm diam.; stems forking at angles less than 45°.
          - k. Stem red, robust; leaves mostly 25–40 mm long .... 12. *L. pithyoides*
          - kk. Stem stramineous or reddish at the tips only; leaves 22 mm long or less .... 10. *L. mexicanum*
        - jj. Leaves mostly ascending, at least toward the stem tip; stem about 2 mm diam.; stem (at least at the base) forking at nearly 90° angle; stem stramineous to greenish .... 6. *L. dichotomum*
      - ii. Leaves, at least lower ones, deltoid-lanceolate.
        - l. Sporangia hidden by the crowded sporophylls; leaves radially arranged, highly imbricate, coriaceous .... 5. *L. cuernavacense*
        - ll. Sporangia not hidden by the overlapping sporophylls, fertile portion of stem relatively loose; leaves weakly dorsiventrally arranged, not highly imbricate, chartaceous to subcoriaceous 16. *L. taxifolium*
- aa. Plants terrestrial; sporophylls in distinct cones (except in *L. reflexum* and *L. hippurideum*); spores various.
  - m. Foliage leaves many-ranked, mostly uniform.
    - n. Plants without cones, spores with foveolate to fossulate ornamentation.
      - o. Leaves shorter than 1 cm; plants usually shorter than 20 cm .... 14. *L. reflexum*
      - oo. Leaves longer than 1 cm; plants usually longer than 20 cm .... 8. *L. hippurideum*
    - nn. Plants with cones; spores with rugulate to reticulate ornamentation.
      - p. Main stems erect, usually naked at the base; habit treelike; vertical stems much branched; cones numerous, pendent; spores rugulate .... 3. *L. cernuum*
      - pp. Main stems creeping or scrambling, at least in part; foliage shoots prostrate; cones solitary or in small groups, erect.
        - q. Vertical stems simple; cones indistinct; spores rugulate .... 1. *L. alopecuroides*
        - qq. Vertical stems branched; cones distinct; spores reticulate .... 4. *L. clavatum*
  - mm. Foliage leaves 4-ranked, dimorphous; stems strongly dorsiventral; spores reticulate .... 17. *L. thyoides*

1. **Lycopodium (Lycopodiella) alopecuroides** L., Sp. Pl. 2:1102. 1753.

—*Lycopodiella alopecuroides* (L.) Holub, Preslia 36:20. 1964. —Type: Virginia, *Kalm s.n.* (LINN 1257.7).

For additional synonymy, see Nessel (1939:262).

Illustrations: Bautista et al., Bol. Mus. Paraense Hist. Nat., Bot. 48:15. 1975; Wherry, Southern Fern Guide 289. 1964; Small, Ferns SE States 409. 1938; Vareschi, Fl. Venez. 1(1):pl. 3. 1969.

Stems prostrate to arching, rooting infrequently, bearing erect fertile branches 10 (35) cm tall; prostrate stems bearing dense, spreading or somewhat appressed, lanceolate leaves ca. 6 (8) mm long, 1 mm wide, leaves sparingly and irregularly ciliate to denticulate along the margin; erect stems with similar leaves but these more decidedly ascending, slightly narrower; cones not pedunculate, continuous with erect stems, ca. 3 (10) cm long, 1 (2) cm diam., with sporophylls slightly longer (ca. 7 mm) than vegetative leaves, total cone width only slightly greater than width of erect stems (including leaves); n = 78 (U.S.).

Along marshy creek bank; rare in Central Plateau; 2700 m. Southern Mex. (Chis. only); S.A. (Ven. to Bol., Braz., Parag., Urug.); Gr. Antill. (Cuba, Hisp.), E and SE U.S. Chiapas Collection: *15165*.

Nessel (1939) distinguished 13 varieties of this widespread and variable species; with so little tropical North American material known, I do not find it expedient to apply one of these names to the sole Chiapas specimen.

The description above is taken from the Chiapas specimen; parenthetical measurements indicate the larger size of specimens elsewhere (southeastern United States) in the range.

2. **Lycopodium (Urostachya) bradeorum** Christ, Repert. Spec. Nov. Regni Veg. 8:20. 1910.

—*Urostachys bradeorum* (Christ) Hert. ex Nessel, Barläppgew. 154. 1939. —Type: Costa Rica, La Palma, *A. & C. Brade 282* (presumably P; isotype UC!).

Illustration: none found.

Similar to *L. orizabae,* differing primarily in having somewhat shorter, narrower leaves ca. 1.0–1.5 (1.8) cm long, ca. 1.0 (0.8–2.0) mm wide, most leaves ca. 1.2 mm wide or less; also leaves not so dorsiventrally arranged; oldest leaves sometimes deciduous.

Pendent epiphyte in Montane Rain Forest, Evergreen Cloud Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau; 1300–2800 m. Southern Mex. (Chis. only), Guat., Nic., C.R. Chiapas Collections: *15233*; *23233*; *29246*; *29969*; *35145*.

More critical study is needed to distinguish adequately this species from *L. orizabae*.

3. **Lycopodium (Lycopodiella) cernuum** L., Sp. Pl. 2:1103. 1753.

—*Lepidotis cernua* (L.) Pal. Beauv., Prodr. Aethéog. 108. 1805. —*Palhinhaea cernua* (L.) Vasc. & Franco, Bol. Soc. Brot. (2) 41:24. 1967. —*Lycopodiella cernua* (L.) Pic. Ser., Webbia 23:166. 1968. —Type: uncertain, "habitat in Indiis." LINN 1257.13 through LINN 1257.17 are this species; several collateral references, some including illustrations, also cited.

For additional synonymy, see Nessel (1939:350–368).

Illustrations: Pritzel, Nat. Pflanzenf. 1(4):603. 1900; Nessel (1939:352); Bautista et al., Bol. Mus. Paraense Hist. Nat., Bot. 48:15. 1975.

Plants to 1 m tall or more; main stems usually erect (sometimes horizontal-arching with several erect branches), terete, 2–3 (5) mm diam., stramineous, with scattered, appressed to spreading, subulate leaves ca. 5 mm long, 0.5 mm wide; lateral branches spreading (lowermost sometimes stoloniferous and rooting), frequently forking, bearing dense, spreading, subulate leaves mostly 2–4 mm long, 0.2–0.5 mm broad, these spirally arranged in numerous ranks; ultimate branches bearing sessile, cylindrical, often pendent cones at the tip, these mostly 0.5–1.0 (2.0) cm long, 2–3 mm wide; sporophylls appressed-imbricate, deltoid-acuminate, fimbriate on the margin; n = 104 (India), ca. 165 (Jam., Trin.).

Terrestrial on slopes, edges of marshes, cafetals; scattered in Northern Highlands, Gulf and Pacific coastal plains, lower elevations of Sierra Madre and Central Plateau; 100–900 (1700) m. Southern Mex. (Ver., Oax., Tab.), Bel., Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Bol., Braz., Parag.); Antill., Trin., SE U.S.; O.W. tropics and subtropics. Chiapas Collections: *GM 141* (DS); *G 601* (NY, PH); *EM 3781* (MEXU, NY, US); *Bt 8* (MEXU); *T 3528* (DS); *9755*; *21030*; *21890*; *22218*; *22546*; *28106*; *28775*; *32237*; *40904*.

Breedlove 9755, has unusually long cones, some 2 cm long and many over 1 cm long. In other respects it is not unusual. Contrary to Underwood and Lloyd (1906), cone length does not seem always to be a reliable character in separating *L. cernuum* from allied South American species.

Nessel (1939) recognized about 45 varieties and forms of this pantropical and variable species; these included at least 4 varieties from Mexico. As far as North American material is concerned, it is difficult or impossible to distinguish these, and so I choose not to apply them to Mexican specimens, which seem rather uniform. Undoubtedly, the species in the broadest sense is a complex, but further study is needed to interpret this variation.

4. **Lycopodium (Lycopodium) clavatum** L., Sp. Pl. 2:1101. 1753.

—Type: uncertain. LINN 1257.2 is this species, but according to Jackson (1912) was not in LINN until after 1755. Lineaus cited numerous collateral references.

For additional synonymy, see Nessel (1939:287).

Illustrations: Nessel (1939:291, 301); Small, Ferns SE States 416. 1938; Vareschi, Fl. Venez. 1(1):pl. 1. 1969.

Main stems prostrate, wide-creeping, 2–3 mm diam., rooting infrequently, giving rise to distant, ascending to erect branches 10–30 cm long, these branches pinnately or subdichotomously forked, bearing dense, stiff, subulate, usually ascending leaves mostly 4–8 mm long, 0.5–1.0 mm wide, leaves arranged in many ranks; some main branches becoming elongate, finely bracteate, erect peduncles, these simple or 1–2 forked and bearing erect cones; cones cylindrical, 1–3 (4) per peduncle, mostly 3–6 (8) cm long, 0.5 cm diam.; sporophylls deltoid-ovate, spreading-aristate at the tip, in ca. 8 ranks; n = 34 (Jam., Eur.).

Terrestrial on roadside banks and slopes adjacent to Montane Rain Forest, Pine-Oak-Liquidambar Forest; common in Northern Highlands (Jitotol Ridge), Central Plateau, uncommon in s Sierra Madre; 1600–3000 m. Southern Mex. (Ver., Mich., Oax., Hgo.), Guat., Salv., Nic., C.R., Pan.; S.A. (Col. and Ven. to Bol., Braz.); Cuba, Jam., Hisp., L. Antill.; wetter, temperate and boreal regions of Alas., Can., U.S., Eur., also temperate and tropical regions of Asia and Pacific Basin. Chiapas Collections: *R 867* (NY, PH); *La 688* (DS); *S 45466* (US); *R&B 20044* (DS); *MC 1889* (US); *T&L 40257* (DS); *T&L 41584* (DS); *Ti 636–46* (DS), *T 480, 594, 730, 883, 1321, 2363* (all DS); *GM 39* (DS); *6901*; *8867*; *12534*; *22634*; *23136*; *40905*. *EM 4080* (MEXU, US); *R&R&M 1160* (US).

Nessel (1939) recognized about 45 varieties and forms of this subcosmopolitan species; they seem poorly characterized, and I am unable to apply an infraspecific name to Chiapas specimens.

5. **Lycopodium (Urostachya) cuernavacense** Underw. & Lloyd, Bull. Torrey Bot. Club 33:110. 1906.

—*Urostachys cuernavacensis* (Underw. & Lloyd) Herter ex Nessel, Bärlappgew. 92. 1939 [as *cuernavensis*]. —Type: Mexico, Morelos, above Cuernavaca, *Pringle 7613* (NY!).

Illustration: none found.

Plants mostly 25–40 (65) cm long; stems stiffly arching downward or pendent, forked 2–4 (6) times, usually ca. 8 cm or more between dichotomies; stems (with leaves) ca. 1.2–2.0 cm diam. near base, 0.5–1.2 cm diam. near apex; leaves isomorphous, coriaceous, shining, in numerous ranks, crowded and strongly imbricate, ascending and appressed nearly throughout, basal ones sometimes somewhat spreading, lanceolate, ca. 1.5 (1–2) cm long, 2 mm wide, midrib immersed but usually distinct; sporophylls similar to leaves but slightly smaller; sporangia always hidden by the imbricate and crowded sporophylls.

Pendent epiphyte in Montane Rain Forest, Evergreen Cloud Forest; relatively common Central Plateau, s Sierra Madre; 2100–3000 m. Southern Mex. (Mlos.). Chiapas Collections: *GM 100* (DS, US); *La 132* (DS); *9221*; *15079*; *15232*; *15373*; *22712*; *22799*; *22819*; *24395*; *29450*; *31550*; *32023*.

In Chiapas, *L. cuernavacense* grows at higher elevations than *L. taxifolium,* its closest relative. The two species have not been found growing together.

6. **Lycopodium (Urostachya) dichotomum** Jacq., Enum. Stirp. Vind. 314. 1762.

—*Urostachys dichotomus* (Jacq.) Hert., Beih. Bot. Centralbl. 39:249. 1922. —*Huperzia dichotoma* (Jacq.) Trev., Atti Soc. Ital. Sci. Nat. 17:248. 1874. —Lectotype (chosen by Proctor, Fl. L. Antill. 2:28. 1977): Jacquin's Hort. Bot. Vind. 3:pl. 45, 1776, illustrating a plant from Martinique (specimen BM).

Illustrations: Proctor, Fl. L. Antill. 2:22. 1977; Small, Ferns SE States 406. 1938.

Plants 15–30 (60) cm long, subpendent from an ascending arcuate base, 2–4 (6) times dichotomous, primary divisions often widely divaricate (45–90°), distal divisions diverging at smaller angles, all branches of equal width or distal ones gradually narrowing; stems 2–4 mm diam. (excluding leaves), 1–3 (4) cm broad including leaves, stramineous to brownish; leaves crowded, spirally arranged in numerous (ca. 10) ranks, spreading (especially the basal ones) to ascending, not dorsiventrally arranged, linear-subulate, mostly 1.5–2.0 cm long, 1.0 mm broad (ours), rigid, entire, often subfalcate, midrib raised below, decurrent onto stem; sporophylls similar to vegetative leaves, not expanded at base, narrower than the readily visible sporangia; $n =$ ca. 132 (P.R.).

Pendent epiphyte in Tropical Rain Forest, infrequently in Tropical Deciduous Forest; uncommon in Northern and Eastern highlands (but not Jitotol Ridge), rarely edge of Central Depression; 300–950 m. Southern Mex. (S.L.P., Pue., Ver., Oax.), Bel., Guat., Nic., C.R., Pan.; S.A. (Col. to Fr. Gui. and Peru, s Braz., Parag.); Fla., Antill., Trin. Chiapas Collections: *So 1657* (MEXU, US); *So 1676* (US); *23392*; *26596*; *29782*; *33204*; *34213*.

Lycopodium arcanum Maxon ex Yuncker (Field Mus. Publ. Bot. 17:310, pl. 3. 1938), with type from Honduras (Dept. Comayagua, above El Achote, *Yuncker et al. 6149,* US) seems very closely related to *L. dichotomum* but may differ by the more filiform and spreading leaves.

7. **Lycopodium (Urostachya) guatemalense** Maxon, Contr. U.S. Natl. Herb. 17:177, pl. 9a. 1913.

—*Urostachys guatemalensis* (Maxon) Herter, Repert. Spec. Nov. Regni Veg. 19:165. 1923. —Type: Guatemala, Alta Verapaz, Pansamalá, *v. Tuerckheim s.n.* [ed. Donn.-Smith 957] (US).

Illustration: only the original.

Similar to *L. linifolium* but differing by the strikingly bright-red stems and reddish tint to the youngest leaves; also differing by the narrower (less than 1 mm wide), more falcate leaves, and possibly more branched stems (to 12 times dichotomous).

Pendent epiphyte in Montane Rain Forest; rare in se Central Plateau near Laguna Tziscao; 1300 m. Southern Mex. (Chis. only), Guat., C.R.? Chiapas Collection: *29630*.

8. **Lycopodium (Urostachya) hippurideum** Christ *in* Pittier, Prim. Fl. Costar. 3:56. 1901.

—*Urostachys hippurideus* (Christ) Herter ex Nessel, Bärlappgew. 88. 1939. —Type: Costa Rica, El Paramo, "massif de Buena Vista," *Pittier 10619* (BR or P; isotype US).

Illustration: Vareschi, Fl. Venez. 1(1):pl. 3. 1969.

Plants ascending to stiffly erect from a decumbent base, stems 20–45 cm long, 2.5–3.5 mm wide (leaves excluded), stramineous to reddish, 1–2 (3)-forked, the divisions also erect, usually 10 cm or more between forks; leaves crowded, spirally arranged in numerous ranks, spreading, often deflexed at stem base, ascending only at stem tip, linear-lanceolate, mostly ca. 15 (12–18) mm long, nearly 1 mm wide at the base, entire, midrib not evident in dried material; sporophylls in distal portion of stems and similar to vegetative leaves.

Terrestrial in Elfin Forest and Evergreen Cloud Forest; uncommon, se side of Cerro Tres Picos (Sierra Madre); 2100–2500 m. Southern Mex. (Oax.?), C.R., Pan.; S.A. (Ven., Col., Peru); Antill. Chiapas Collections: *25410*; *30146*; *34423* (all from same locality).

Very near *L. mexicanum,* which differs primarily by being a stiffly pendent epiphyte; *Lycopodium hippurideum* is terrestrial and rather stiffly erect. The latter is also less branched, with longer internodes. The leaves of the two species seem indistinguishable in size, arrangement, and manner of deflexion, and it seems to me possible that the two species are the same. Still, it is rather unusual in *Lycopodium* for the same species to occupy both terrestrial and epiphytic habitats. Of Mexican species of *Lycopodium,* I am aware of only *L. reflexum* that can occupy both habitats, although that species is generally regarded as being strictly terrestrial.

Lycopodium hippurideum is closely related to *L. montanum* Underw. & Lloyd from the West Indies and also *L. lechleri* Hieron. from Bolivia. Nessel (1939) treated *L. montanum* as a variety of *L. hippurideum*.

9. **Lycopodium (Urostachya) linifolium** L., Sp. Pl. 2:1100. 1753.

—*Urostachys linifolius* (L.) Hert., Repert. Spec. Nov. Regni Veg. 19:165. 1923. —*Huperzia linifolia* (L.) Trev., Atti Soc. Ital. Sci. Nat. 17:248. 1874. —LECTOTYPE (chosen by Proctor, Fl. L. Antill. 2:26. 1977): Plumier's Tract. Fil. Amer. pl. 166, fig. C, 1705, illustrating a plant from either Martinique or Hispaniola.

ILLUSTRATIONS: Nessel (1939:160); Proctor, Fl. L. Antill. 2:22. 1977; Pritzel, Nat. Pflanzenf. 1(4):595. 1900; Bautista et al., Bot. Mus. Paraense Hist. Nat., Bot. 48:15. 1975; Vareschi, Fl. Venez. 1(1):pl. 2A. 1969.

Plants flaccid, (15) 20–65 cm long, 2–6 (8) times forked, the branches narrowly diverging; stems 0.5–1.0 (1.4) mm diam. (leaves excluded), 2.5–4.0 (5.0) cm broad including leaves, often narrower distally, stramineous to tan; leaves spreading to oblique, subdistant (not imbricate), borne spirally in 4–6 ranks, twisted so that they appear somewhat dorsiventrally arranged, linear-lanceolate, 1.0–2.5 cm long, 1.5–2.5 (3.5) mm broad in lower third, straight or subfalcate, usually light or yellowish green, thin-herbaceous, margins entire; costae prominent abaxially, decurrent onto stems; sporophylls similar to leaves but usually somewhat shortened and more ascending; *n* = ca. 130–140 (P.R.).

Pendent epiphyte in Lower Montane and Montane rain forests, infrequently Seasonal Evergreen Forest; uncommon in Northern Highlands (not Jitotol Ridge) and SE Central Plateau near Guatemala border; 900–1300 m. Southern Mex. (Pue., Ver., Oax.), Bel., Guat., Hond., Nic., C.R., Pan.; S.A. (Col. to Sur. and Bol., Braz.); Antill., Trin., Tob. CHIAPAS COLLECTIONS: *29590*; *30858*; *31518*; *32263*; *32875*; *35145-A*; *38826*.

Nessel (1939) recognized nine varieties of this widespread and variable species. Chiapas specimens seem to resemble most closely Nessel's var. *linifolium* and var. *laxum*, but I do not feel confident in adopting either (or both) of these names.

10. **Lycopodium (Urostachya) mexicanum** Hert., Bot. Jahrb. Syst. 43, Beibl. 98:49. 1909.

—*Urostachys mexicanus* (Hert.) Hert., Repert. Spec. Nov. Regni Veg. 19:164. 1923. —TYPE LOCALITIES: Mexico (S.L.P., Oax.), Jamaica, Puerto Rico, French Guiana, specific collections not cited.

ILLUSTRATION: none found.

Plants pendent from an erect or arching base; stems 20–40 cm long, 2.5–4.0 mm diam. (leaves excluded), ca. 2–3 cm wide including leaves, stramineous to tan (rarely faintly reddish), 2–4-forked, the divisions stiff, narrowly divergent; leaves crowded, spirally arranged in numerous ranks, usually deflexed, ascending only at stem tip, linear-lanceolate, mostly 10–15 (22) mm long, ca. 1 mm wide at the base, midrib not evident; sporophylls similar to vegetative leaves, confined to distal portion of stems.

Pendent epiphyte in Evergreen Cloud Forest; uncommon in Central Plateau, S Sierra Madre; 2700–3000 m. Southern Mex. (according to Herter, S.L.P., Oax.); also Guat.; Gr. Antill. CHIAPAS COLLECTIONS: *GM 112* (DS); *15097*; *22800*.

Differing from *L. pithyoides* by the pendent habit, by the shorter, more deflexed leaves, and the stramineous stems (occasionally faintly reddish). An even closer relative seems to be *L. hippurideum*, which see for discussion.

11. **Lycopodium (Urostachya) orizabae** Underw. & Lloyd, Bull. Torrey Bot. Club 33:110. 1906.

—*Urostachys orizabae* (Underw. & Lloyd) Hert. ex Nessel, Bärlappgew. 175. 1939. —TYPE: Mexico, Veracruz, Orizaba, *Müller 690* (NY; photo NY!)

ILLUSTRATION: none found.

Plants laxly pendent, short, 10–16 cm long, with stems forking beginning near stem base 1–4 times, 2–3 mm diam. at the base (excluding leaves); leaves isomorphous, in 4–6 ranks, the oldest ones well spaced, twisted at the base so as to be arranged in a plane, chartaceous, lanceolate, ca. 1.5–2.0 cm long, (1.5) 2–3 mm broad, widest near middle, narrowed at base, with a distinct raised midrib extending nearly entire length of leaf; proximal leaves spreading, distal ones ascending, not so obviously twisted at the base; sporophylls like the leaves but smaller, with sporangia not or only partially hidden.

Pendent epiphyte in Montane Rain Forest, Pine-Oak-Liquidambar Forest; uncommon in Northern Highlands (Jitotol Ridge), Central Plateau; 1700–2200 m. Southern Mex. (Ver.). CHIAPAS COLLECTIONS: *28201*; *32643*.

12. **Lycopodium (Urostachya) pithyoides** Schlecht. & Cham., Linnaea 5:623. 1830.

—*Urostachys pithyoides* (Schlecht. & Cham.) Hert., Repert. Spec. Nov. Regni Veg. 19:164. 1923. —TYPE: Mexico, Veracruz, Jalapa, *Schiede & Deppe s.n.*

Lycopodium gigas Hert., Bot. Jahrb. Syst. 43, Beibl. 98:50. 1909. —SYNTYPES: "Südmexiko," collector not stated; Cuba, St. Yago, Libani, *Linden 1996* (P, not seen; isosyntype of *Linden 1996* at K!).

ILLUSTRATION: Stokey, Bot. Gaz (Crawfordsville) 44:58. 1907.

Plants erect to suberect or stiffly arching from a curved, rather massive base; stems mostly 20–30 cm long, 4–5 (10!) mm diam. (leaves excluded), ca. 4–7 cm wide including leaves, reddish (infrequently tan or brownish), 2–4 (5)-forked, the divisions stiff, narrowly to widely divergent; leaves rigid, coriaceous, crowded, spirally arranged in numerous ranks, spreading or those at stem base sharply deflexed, ascending only at stem tip, linear-lanceolate, mostly (2.5) 3–4 cm long, ca. 1 mm wide or less, midrib not evident; sporophylls similar to vegetative leaves, not reduced.

Epiphyte in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Seasonal Evergreen Forest; scattered in Northern Highlands, N Sierra Madre, Central Plateau; 900–1600 m. Southern Mex. (Tam., Ver., Oax.), Guat.; Ven.; Cuba. CHIAPAS COLLECTIONS: *A 1291* (UC); *GM s.n.* (DS, UC); *23307*; *27976*; *30048*; *30908*; *31419*; *32495*; *35430*.

Closely related to *L. mexicanum*, which see for discussion.

Stokey [Bot. Gaz. (Crawfordsville) 44:57–63. 1907] described the stem anatomy of this unusually robust *Lycopodium*.

13. **Lycopodium (Urostachya) pringlei** Underw. & Lloyd, Bull. Torrey Bot. Club 33:109. 1906.

—*Urostachys pringlei* (Underw. & Lloyd) Hert. ex Nessel, Bärlappgew. 131. 1939. —TYPE: Mexico, Oaxaca, Sierra de Clavellinas, *Pringle 4994* (NY; isotypes K! UC!).

ILLUSTRATION: none found.

Plants mostly 30–90 cm long; stems dichotomizing frequently, often from the very base, 5–8 (or more) times forking, the divisions flaccid, slender; stems 0.5–1.0 mm diam. (excl. leaves) at the base, 0.2–0.5 mm diam. toward the tip; leaves isomorphous, linear-lanceolate, ca. 6 ranks, oldest leaves at stem base spreading, to 6 mm long, 0.5 mm wide, distal leaves becoming more appressed, curved upwards, and seemingly more distant; branches discontinuously sporangiate in distal portion, variable in width because of crowded sporophylls and sporangia; sporophylls broadly ovate, acute to acuminate at tip, ca. 1.3–2.0 mm long, 0.8–1.5 mm broad, keeled, in ca. 4–6 ranks.

Pendent epiphyte in Evergreen Cloud Forest, less frequently in Montane Rain Forest, Pine-Oak-Liquidambar Forest; common in Central Plateau, s Sierra Madre, less so in Northern Highlands (Jitotol Ridge); 2000–3000 m. Southern Mex. (Jal., Mlos., Oax., Ver.), Guat.; probably also S.A. CHIAPAS COLLECTIONS: *C 247* (DS); *GM 94* (DS); *GM with 94* (DS, US); *GM 181* (DS, US); *L&S 9853* (US); *MC 1676* (US); *A 1227* (DS, UC); *EM 225* (MEXU, US); *G 614* (YU); *La 133* (DS); *EM 1631* (MEXU, NY, US); *8134*; *14377*; *15077*; *15231*; *15364*; *21499*; *22103*; *22774*; *28200*; *29972*; *31869*; *32047*; *32083*; *33566*; *33632*; *34665*.

It is probable that there are older names that apply to this species, e.g., *L. tenue* Humb. & Bonpl. ex Willd. (Sp. Pl., ed. 4, 5:55. 1810, type from Peru, Vinajam, *Humboldt & Bonpland s.n.*). I have seen several collections from South America (e.g., *Steinbach 8450*, UC, Bolivia) that are virtually indistinguishable from Mexican specimens. Many New World specimens of *L. pringlei* have been identified as *L. verticillatum* L.f., but the type of that species is from Réunion. African material of *L. verticillatum* has longer, narrower, and more spreading leaves than specimens I have seen from Mexico and Central America. Another name that is commonly applied to Neotropical specimens is *L. setaceum* Lam. (Encycl. Méth. 3:653. 1789), syntypes from Antilles and Réunion; however, most plants I have seen from the Lesser Antilles (e.g., *Stehle 4492*, UC, from Martinique) also have narrower and more spreading leaves. Proctor (Fl. L. Antill. 2:25. 1977) treated *L. setaceum* as a synonym of *L. verticillatum*. The whole complex needs to be restudied monographically. In the meantime, I choose to apply the name *L. pringlei* to Chiapas collections.

Clarke 247 (DS), said to be collected at El Chorreadero (Central Depression), is surely an erroneous labelling. Most likely, it was collected at higher and wetter elevations on the Jitotol Ridge.

The first-produced leaves of this species (juvenile leaves) are invariably more spreading than leaves at the ends of long, pendent branches. Also, the sporophylls show great variation in the degree of crowding. These two variables result in rather different-looking plants; consequently this species has been described several times.

14. **Lycopodium (Urostachya) reflexum** Lam., Encycl. Méth. Bot. 3:653. 1789.

—*Urostachys reflexus* (Lam.) Hert., Beih. Bot. Centralbl. 39:249. 1922. —*Huperzia reflexa* (Lam.) Trev., Atti Soc. Ital. Sci. Nat. 17:248. 1874. —TYPE: Martinique, *Martin s.n.* (P—LA 442).

For additional synonymy, see Underwood & Lloyd (1906:104).

ILLUSTRATIONS: Nessel (1939:113); Vareschi, Fl. Venez. 1(1):pl. 2. 1969.

Plants ascending to stiffly erect, sometimes from a decumbent or decurved base; stems mostly (10) 15–30 (rarely to 70) cm long, 1.5–2.5 (3.0) mm broad (leaves excluded), or 8–12 (15) mm broad (leaves included), stramineous to brownish, 0–2 (3)-forked, the divisions erect or laxly erect, coarctate, usually 8 cm or more between forks; leaves crowded, spirally arranged in numerous ranks, often sharply deflexed, ascending only at stem apex, linear-lanceolate, mostly 5–7 (10) mm long, 0.5–0.8 mm wide at the base, ciliolate-denticulate along the margin, pungent at the tip, midrib not evident; sporophylls in distal half or more of stems, similar to other leaves; n = ca. 128 (Jam.).

Terrestrial on banks in Montane Rain Forest, Pine-Oak-Liquidambar Forest, infrequently epiphytic in Montane Rain Forest; uncommon in Northern Highlands, Central Plateau (lower elevations), s Sierra Madre; 1000–1900 m. Southern Mex. (Jal., Méx., Gro., Ver., Oax.), Guat., Salv., Hond., Nic., C.R., Pan.; S.A. (Ven. and Col. to Bol., Parag., Braz.); Antill. CHIAPAS COLLECTIONS: *EM 2749* (MEXU, US); *GM s.n.* (DS); *T&L 40349* (DS); *22613*; *23137*; *31608*; *32496*; *34564*.

Contrary to Nessel (1939) and Underwood and Lloyd (1906), this species apparently has the ability to grow either terrestrially or as an epiphyte (*EM 2749*; *34564*). This needs to be verified by additional field observations.

15. **Lycopodium (Urostachya) skutchii** Maxon, Proc. Biol. Soc. Wash. 46: 159. 1933.

—TYPE: Guatemala, Dept. Chimaltenango, Chichavac, *Skutch 243* (US).

ILLUSTRATION: **Fig. 82.**

Stems mostly 25–60 (75) cm long, 1 mm diam. or less (leaves excluded), angulate, forked mostly 6–12 times; vegetative leaves and sporophylls strongly dimorphic, usually abruptly so, with vegetative leaves occupying basal (⅓) ½–¾ of stems; vegetative leaves spreading, mostly non-overlapping, obscurely 8-ranked, dorsiventrally arranged by twisting of leaf bases, 8–11 mm long, 2.5–4.0 mm broad, narrowly ovate to oblong-lanceolate, entire, acuminate at apex, tip often apiculate, narrowly rounded at base, subsessile, the midrib raised below, wrinkled above when dry; reproductive stems mostly 5–20 (30) cm long, ca. 1.5–2.0 mm wide (including sporophylls); sporophylls broadly ovate, 2–4 mm long, ca. 1.5–2.0 mm broad, carinate, seemingly in 4 ranks, congested or not, terminal part of strobile often more congested than basal part.

Pendent epiphyte in Montane Rain Forest, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; relatively common in Northern Highlands (Jitotol Ridge), Central Plateau, s Sierra Madre; 1300–3000 m. Southern Mex. (Chis. only), Guat., Hond., Nic., C.R.; S.A. (Ven., Peru?). CHIAPAS COLLECTIONS: *EM 1631* (US); *EM 2931* (MEXU, NY, US); *EM 5244* (DS, MEXU, US); *L&S 9930* (US); *Ti 636-39* (DS); *12892*;

15078; *15234*; *15372*; *21498*; *22769*; *23232*; *28198*; *29560*; *29640*; *31733*; *31853*; *32027*; *32444*; *32656*; *33567*; *34418*; *34649*; *40326*.

Most closely related to *L. callitrichaefolium* Mett., known from Guatemala southward, and *L. aqualupianum* Spring, primarily from the Greater Antilles.

16. Lycopodium (Urostachya) taxifolium Swartz, Prodr. Veg. Ind. Occ. 138. 1788.

—*Huperzia taxifolia* (Swartz) Trev., Atti Soc. Ital. Sci. Nat. 17:248. 1874. —*Urostachys taxifolius* (Swartz) Hert., Repert. Spec. Nov. Regni Veg. 19:162. 1923. —Type: Jamaica, *Swartz s.n.* (presumably S).

Illustrations: Nessel (1939:172); Proctor, Fl. L. Antill. 2:22. 1977.

Stems (15) 25–60 (70) cm long, 2–3 cm broad including leaves (2–4 mm diam., leaves excluded), mostly 3–7 times forked, the divisions rigid to lax, diverging at 40–60° (80°) in the proximal dichotomies, subparallel in distal (fertile) dichotomies; leaves somewhat dorsiventrally arranged, arising spirally from ca. 8–10 ranks, strongly to slightly imbricate, lanceolate, 1–2 cm long, 2–3 mm broad just above their base, spreading (proximal ones) to ascending (distal ones), entire, midrib concealed or faintly visible, not raised; sporophylls similar to vegetative leaves but gradually reduced toward stem apex, to ca. 5–8 mm long (smallest ones), with a lanceolate tip from an expanded, ovate base ca. 1 mm wide; strobiles ultimately 3–5 mm wide; sporangia not hidden by sporophylls.

Pendent or downward-arching epiphyte in Tropical and Montane rain forests, Pine-Oak and Pine-Oak-Lqiuidambar forests; locally common in Central Plateau (especially vicinity of Lagunas Monte Bello and Tziscao), Eastern and Northern highlands (Jitotol Ridge); 300–1700 m. Southern Mex. (Sin., Tam., D.F., Mich., Oax., Ver., Pue.), Guat., Nic., C.R.; S.A. (Ven. to Peru); Antill., Trin. Chiapas Collections: *So 1638* (MEXU, US); *G 612* (YU); *Dr 1580* (MEXU, NY, UC, US); *GM s.n.* (DS); *21134*; *22300*; *29571*; *29594*; *29629*; *29777*; *32139*; *32222*; *32255*; *32445*; *32457*; *34753*; *35163*; *37961*; *40949*; *41919*.

The youngest stems, especially the fertile ones, of *L. taxifolium* tend to be much narrower than the oldest ones, and the leaves are progressively shorter, narrower, and not so imbricate. This leads to rather different aspects of old and young shoots and has probably resulted in the application of numerous names to this rather common and widespread species. In particular, the names *L. passerinoides* H.B.K. (type from Peru), *L. nitens* Schlecht. & Cham. (Linnaea 5:623. 1830, type from Veracruz, Mexico), and *L. schwendeneri* Hert. (type not specified, range given as Mexico to Costa Rica, Haiti, and Venezuela) probably apply to plants (or portions of plants) with narrower stems and smaller, less imbricate leaves.

17. Lycopodium (Lycopodium) thyoides Humb. & Bonpl. ex Willd., Sp. Pl., ed. 4, 5:18. 1810.

—Type: Venezuela, Scilla de Caracas, *Humboldt s.n.* (B —Herb. Willd. 19352; isotype P).

Lycopodium complanatum L. var. *validum* Weatherby, Proc. Amer. Acad. Arts 45:414. 1910. —Syntypes: all from Mexico. Chiapas, between San Cristóbal Las Casas and Huistán, *C. & E. Seler 2273*; Chiapas, *Ghiesbreght 600*; Oaxaca, Cerro San Felipe, *Gonzalez & Conzatti 889*; Veracruz, region d'Orizaba, *Bourgeau 3159*, in part; Hidalgo, Trinidad, *Pringle 11856* (all GH). Wilce (1965:157) called this an "incorrect" name; I am uncertain what this means. Under the rules of nomenclature, var. *validum* seems effectively and validly published.

For additional synonymy, see Wilce (1965:156).

Illustration: no good one found.

Underground stems apparently deeply buried, terete, long-creeping, ca. 1.5–2.5 mm diam., giving rise to ascending or erect aerial shoots, these mostly 25–50 cm long, with scattered, subulate, isomorphous, spirally arranged leaves ca. 2–4 mm long; main aerial stems ± monopodial, indeterminate for one or more seasons, bearing flabellate planar sprays of side branches at intervals, ultimately producing one or a few elongate fertile peduncles; peduncles dichotomizing 2–4 times near their apex, bearing (4) 8–12 (18) erect cones, these ca. 2.5–3.0 mm wide, 2–7 cm long, sometimes with sterile tip 1 cm or more long; leaves on ultimate flattened branchlets in 4 ranks, dimorphic, the lateral two ranks decussate with slightly spreading tips, the upper and lower ranks appressed, lower leaves less conspicuous than upper ones due to reduction of leaf base.

Terrestrial in Montane Rain Forest, Pine-Oak Forest, Evergreen Cloud Forest; common in Central Plateau, Northern Highlands (Jitotol Ridge), Sierra Madre; 1700–2800 m. Southern Mex. (Hgo., Ver., Pue., Oax.), Guat., C.R.; S.A. (Ven. and Col. to Bol., Braz.); Jam. Chiapas Collections: *La 384*, *1225*, *2342* (DS); *GM 90* (DS), *EM 4079* (MEXU); *T&L 41433* (DS); *T 47*, *424*, *479*, *1320*, *1343* (DS); *R&B 19992* (DS); *L&S 9871* (US); *R&R&M 1235* (US); *JTM 1251* (NY, US); *MC 1657* (US); *S 45997* (US); *G 600* (NY); *6643*; *6909*; *7044*; *8152*; *10818*; *12441*; *12940*; *23157*; *30104*; *31943*; *32347*.

Wilce (1965) referred to *L. thyoides* in tropical America as representing a complex requiring additional study. The differences between plants from Mexico and South America are small enough so that it seems best to use the name in a broad sense until such a time that *L. thyoides* can be studied monographically.

18. Lycopodium (Urostachya) tuerckheimii Maxon, Contr. U.S. Natl. Herb. 13:23, pl. 1. 1909.

—*Urostachys tuerckheimii* (Maxon) Hert., Repert. Spec. Nov. Regni Veg. 19:163. 1923. —Type: Guatemala, Alta Verapaz, near Cobán, *v. Tuerckheim II 1864* (US).

Illustrations: Nessel (1939:128); see also original.

Similar to *L. pringlei*, differing from that in the more delicate branches, these 0.5–1.0 mm diam. (including leaves) in the distal portion of the plant; oldest leaves ascending to adpressed, not spreading; dichotomies numerous, widely divaricate at mostly 45–80° angles.

Pendent epiphyte in Pine-Oak-Liquidambar Forest; rare in SE Central Plateau near Guatemala border (Montebello region); 1300 m. Southern Mex. (Chis. only), Guat., Hond. Chiapas Collection: *29583*.

This species is obviously closely related to *L. pringlei*, and I have considered treating the two as conspecific. The sole Chiapas specimen cited differs from specimens of *L. pringlei* by its more delicate, finer-branching system and lanceolate sporophylls. In addition, it grows at a lower elevation than *L. pringlei*. The floras of Montebello and Cobán, Alta Verapaz, share many plants unknown elsewhere, so it is not unlikely that *L. tuerckheimii* represents a restricted endemic.

Lycopodium tortile Christ, type from Costa Rica, seems closely related to *L. tuerckheimii* but differs in having stems forked more frequently, with even finer, almost capillary branches.

Species to Be Looked for in Chiapas

Lycopodium (Urostachya) attenuatum Spring (syn. *L. eriksonii* Hert. ex Nessel) —Oax., Guat., C.R., Col., Ecu. Terrestrial, the erect stems with thick, lanceolate, highly imbricate leaves in numerous ranks. Not closely related to any known Chiapas species. A very similar species in Andean regions is *L. crassum* Humb. & Bonpl.

Lycopodium (Urostachya) callitrichaefolium Mett. (syn. *L. dichaeoides* Maxon) —Guat., Nic., C.R., Pan., Col., Ecu. Closely allied to *L. skutchii,* differing primarily by the leaves oval or obovate, not acute at the tip.

Lycopodium (Lycopodiella) carolinianum L. —New Jersey to Tex., Mex. (Tab.), Bel., Hond., Nic. Terrestrial, the foliage shoots prostrate, creeping, the vertical stems simple, with a terminal strobilus. Differs from *L. alopecuroides,* our closest relative, by the smaller, well-spaced leaves on the erect shoots.

Urostachys lindeneri Nessel —Guat. (type); Nessel (1939) also cited a collection from Orizaba (Veracruz). I am uncertain as to the identity of this species. From Nessel's plate (Rev. Sudam. Bot. 6:164, pl. 11, fig. 50. 1940), it is probably the same as *U. schlechtendalii,* and both seem indistinguishable from *Lycopodium dichotomum.*

Urostachys schlechtendalii Nessel —Type from Mexico, "ad Guaveyma," *A. Wagner,* 1849 (Herb. Beukert and Herb. Merson); Nessel (1939) also cited a Schaffner collection from Valle de México. From Nessel's plate (Rev. Sudam. Bot. 6:164, pl. 11, fig. 51. 1940), this species is probably the same as *U. lindeneri,* and both seem indistinguishable from *Lycopodium dichotomum.*

107. PSILOTUM

Psilotum Swartz, J. Bot. (Schrader) 1800(2):8, 109. "1801" [1802]. —Lectotype (first chosen by Brongniart, Dict. Class. Sci. Nat. 9:558. 1826): *Psilotum triquetrum* Swartz [≡*Psilotum nudum* (L.) Pal. Beauv.].

For additional synonymy, see Pichi Sermolli (Webbia 26:183. 1971).

Plants epiphytic or terrestrial, with short-creeping, highly branched rhizomes, these bearing brownish, hairlike rhizoids, plants lacking true roots; main stems simple in proximal part, repeatedly dichotomous distally, the numerous divisions narrow, terete, or angular to flattened, glabrous; leaves few, minute, mostly alternate, scalelike; sporangia globose to 2–3-lobed, sessile in axils of minute, usually 2-lobed sporophylls, 2–3-celled, dehiscing by vertical valves, borne on all but the main stems and primary dichotomies; spores all alike, bilateral, hyaline; gametophytes subterranean, axial, not green; $x = 52$.

Two or perhaps a few more species, one of which is pantropical (*Psilotum nudum*). Characteristically, *Psilotum* grows on decaying trunks and partially rotted logs or at the base of trees. The relationships of *Psilotum* are controversial.

Reference: Wagner, W. H., Jr. 1977. Systematic implications of the Psilotaceae. Brittonia 29:54–63 (part of a symposium on the taxonomic and morphological relationships of the Psilotaceae, Brittonia 29:1–68).

1. **Psilotum nudum** (L.) Pal. Beauv., Prodr. Fam. Aethéog. 106, 112. 1805.

—*Lycopodium nudum* L., Sp. Pl. 2:1100. 1753. —*Psilotum triquetrum* Swartz, J. Bot. (Schrader) 1800(2):132. "1801" [1802]. —Type: LINN 1257.1 is this species; Linnaeus also cited Dillenius and Plumier illustrations.

Illustrations: Proctor, Fl. Less. Antill. 2:17. 1977; Knobloch & Correll, Ferns Chih. 17. 1962; Small, Ferns SE States 397. 1938.

Plants erect or arching, mostly 20–60 (70) cm long; main stems 2–4 mm diam., angled, dichotomously branched 3–8 times; ultimate branches mostly 1 mm diam.; leaves ca. 1.0–2.0 mm long; sporangia light brown or yellowish, ca. 2 mm diam.; $n = 52$, 104 (Jam.).

In Chiapas known from a single collection from El Carmen. Southern and w Mex. (Chih., Son., Oax., Ver.), Hond., Nic., C.R.; S.A. (Col. to s Braz., NE Arg., Parag.); SE U.S., Antill.; O.W. trop. Chiapas Collection: *GM 102* (DS).

Psilotum complanatum Swartz, with strongly flattened branch systems, has been attributed to many countries in the New World, but specimens so labelled seem to be merely more angular forms of *P. nudum.* Typical *P. complanatum* may be confined to the Pacific Basin.

108. SELAGINELLA

Selaginella Pal. Beauv., Prodr. Fam. Aethéog. 101. 1805, nom. cons. —Type: *Selaginella spinosa* Pal. Beauv. ≡ *Selaginella selaginoides* (L.) Link [≡*Lycopodium selaginoides* L.].

Plants terrestrial or lithophytic, occasionally epiphytic, prostrate to ascending or erect, usually highly branched; stems leafy, usually producing filiform to wiry rhizophores at some or all of the nodes; leaves all alike or of two kinds, elliptic to ovate to subulate, several-ranked or in two planes, numerous, minute (usually less than 10 mm long), 1-nerved, approximate to closely imbricate; sporophylls somewhat modified, borne in compact, sessile spikes or cones at apex of branches; sporangia of two kinds (plants heterosporous), solitary in axils of bracts; megasporangia containing 1–4 rather large megaspores (mostly 200–1000 μm diam.); microsporangia containing numerous much smaller microspores; $x = 7, 8, 9, 10$.

Subcosmopolitan, perhaps 600 species. Twenty-four species are known from Chiapas with perhaps as many as eight more likely to be found in the state. Alston (1955) recongized 56 heterophyllous species from continental (mostly tropical and subtropical) North America; Tryon (1955) delineated 31 homophyllous species from continental North America. About 130 species of *Selaginella* are known from South America (Alston, unpublished key), with all but 4 species heterophyllous; nearly 100 of these are endemic to South America. The West Indian species are fewer, about 27 species (Alston, 1952). Altogether, about 180–200 species are known in the New World.

In general, the homophyllous species occur in drier, upland habitats, while the heterophyllous species occupy rain-forest habitats. Southern Mexico is a minor center of speciation for the heterophyllous species, while northern Mexico and southwestern United States are major centers of speciation for the homophyllous species.

Hellwig (1969) presented a key to the heterophyllous species based exclusively on spore morphologies. I have looked at spores of most Chiapas species in order to assess the usefulness of Hellwig's key. Some of my observations are at variance with those of Hellwig while other observations confirm his findings. In general, there appears to be more variation within species than Hellwig acknowledges. In any case, it seems certain that spore characters are useful in circumscribing species of *Selaginella,* and I include what is known in the descriptions.

The key to species is modified from Alston's (1955) key.

REFERENCES: ALSTON, A. H. G. 1952. A revision of the West Indian species of *Selaginella*. Bull. Brit. Mus. (Nat. Hist.), Bot. 1:25–50; 1955. The heterophyllous Selaginellae of continental North America. Bull. Brit. Mus. (Nat. Hist.), Bot. 1:222–274; HELLWIG, R. L. 1969. Spores of the heterophyllous Selaginellae of Mexico and Central America. Ann. Missouri Bot. Gard. 56:444–464; TRYON, R. M. 1955. *Selaginella rupestris* and its allies. Ann. Missouri Bot. Gard. 42:1–99; GREGORY, D., AND R. RIBA. 1979. Selaginellaceae. Pages 1–35 *in* Flora de Veracruz 6.

a. Leaves uniform throughout, spirally arranged, subulate (subg. *Selaginella*) .... 24. *S. steyermarkii*
aa. Leaves dimorphous (at least in part), in two planes (subg. *Stachygynandrum*).
b. Stems articulate, usually sulcate when dry; microspores tan; megasporophylls sometimes much larger than microsporophylls.
c. Lateral leaves subcoriaceous; median leaves broadly white-margined .... *S. marginata*
cc. Lateral leaves membranaceous; median leaves not conspicuously white-margined.
d. Main stems flagelliform at apex .... 21. *S. sertata*
dd. Main stems not flagelliform at apex.
e. Median leaves with two subequal auricles.
f. Auricles of median leaves very short; median leaves aristate; lateral leaves oblong; stems rooting in lower two-thirds .... 22. *S. silvestris*
ff. Auricles of median leaves large, equal to one quarter of lamina; median leaves acuminate; lateral leaves ovate-oblong; stems rooting in lower third .... 23. *S. stellata*
ee. Median leaves with one auricle or unequal auricles, one twice as large as the other.
g. Auricles of axillary leaves subparallel .... 4. *S. eurynota*
gg. Auricles of axillary leaves divergent .... 20. *S. schizobasis*
bb. Stems not articulate, rarely sulcate; microspores orange; mega- and microsporophylls the same size.
h. Stems tufted, curling inwards when dry; leaves usually subcoriaceous.
i. Lateral leaves, especially old ones, reddish with age; median leaves obtuse, with broad white margins .... *S. lepidophylla*
ii. Lateral leaves turning pale (or light reddish) brown or stramineous with age; median leaves acute or aristate.
j. Old leaves drying buff; leaves silvery beneath .... 15. *S. pallescens*
jj. Old leaves drying light reddish brown; leaves dull green beneath .... 11. *S. microdendron*
hh. Stems not tufted (plants frondose); leaves usually membranaceous.
k. Stems reddish at base, erect.
l. Leaves of main stem uniform, directed upwards; stems bright red .... *S. umbrosa*
ll. Leaves of main stem dimorphous, except at base of stem; stem pale reddish .... 7. *S. hoffmannii*
kk. Stems not reddish, or if faintly reddish, then the stems prostrate.
m. Leaves on main stems uniform.
n. Leaves wrinkled on upper surface .... 12. *S. mollis*
nn. Leaves not wrinkled on upper surface.
o. Lower margin of lateral leaves truncate at base .... 14. *S. oaxacana*
oo. Lower margin of lateral leaves rounded at base.
p. Median leaves with broad white margins; microspores smooth or slightly verrucose.
q. Old leaves drying buff; leaves silvery beneath .... 15. *S. pallescens*
qq. Old leaves drying light reddish brown; leaves dull green beneath .... 11. *S. microdendron*

pp. Median leaves not white-margined; microspores papillose.
r. Lateral leaves subequal on main stem or lower half of frondlike portion .... 17. *S. pulcherrima*
rr. Lateral leaves dimorphous throughout frondlike portion .... *S. illecebrosa*
mm. Leaves everywhere dimorphous, sometimes smaller at base of main stem.
s. Stems and/or branches with flagelliform apices, or plants soboliferous (bearing stolons from stem base).
t. Lateral leaves ciliate; median leaves strongly auriculate; stems sparingly soboliferous at base, suberect, with rhizophores confined to lower third.
u. Leaves wrinkled when dry, not shining; microspores spinulose on distal face, shed singly .... 12. *S. mollis*
uu. Leaves not wrinkled when dry, shining; microspores smooth to verrucose, shed in tetrads .... 13. *S. novae-hollandiae*
tt. Lateral leaves entire or ciliolate-denticulate; median leaves scarcely auriculate; stems and/or branches flagelliform; microspores smooth, warted, or spiny.
v. Megaspores dull reddish brown; lateral leaves with two false nerves, acute, upper surface usually short-pubescent; microspores with slender spines; middle to high elevations, (1250) 1700–3000 m .... 16. *S. porphyrospora*
vv. Megaspores white; lateral leaves without false nerves, glabrous; microspores with slender spines; lower elevations, less than 1000 m.
w. Main stems faintly pinkish at base .... 5. *S. flagellata*
ww. Main stems stramineous .... 3. *S. cladorrhizans*
ss. Stems and/or branches without flagelliform apices; plants not soboliferous.
x. Stems prostrate, rooting throughout.
y. Median leaves denticulate, rarely with a few scattered cilia towards the base.
z. Median leaves with arista nearly as long as lamina; microspores with stalked, capitate papillae .... *S. tarapotensis*
zz. Median leaves with arista less than half as long as lamina.
a′. Lateral leaves pubescent on upper surface.
b′. Megaspores dull reddish brown; middle to high elevations, (1250) 1700–3000 m .... 16. *S. porphyrospora*
bb′. Megaspores whitish; low to middle elevations, below 1200 m .... 9. *S. lindenii*
aa′. Lateral leaves glabrous.
c′. Lateral leaves obtuse, concave; median leaves without white margins .... *S. delicatissima*
cc′. Lateral leaves acute; median leaves with 1 (2) rows of elongated marginal whitish cells .... 1. *S. apoda*
yy. Median leaves ciliate in upper half.
d′. Lateral leaves less than twice as long as broad.
e′. Median and lateral leaves imbricate; median leaves strongly white-margined; leaves bluish green .... 18. *S. reflexa*
ee′. Median and lateral leaves not strongly imbricate; median leaves with narrow white margins; leaves green .... 19. *S. schiedeana*
dd′. Lateral leaves more than twice as long as broad, ciliate (except in *S. guatemalensis*).
f′. Rhizophores stout and straight; microspores more or less reticulate, with high muri.
g′. Lateral leaves diverging at 45°; median leaves ovate.
h′. Median leaves acuminate, with narrow white margin; lateral leaves rounded at base, denticulate or shortly ciliate .... 6. *S. guatemalensis*
hh′. Median leaves aristate, with broad white margin; lateral leaves subcordate, long-ciliate .... 8. *S. huehuetenangensis*
gg′. Lateral leaves forming a right angle with the stem; median leaves ovate to suborbicular.
i′. Median leaves ovate, the two ranks not at all or only slightly imbricate; underside of leaves silvery; median leaves acute to acuminate .... 2. *S. chiapensis*
ii′. Median leaves suborbicular, strongly imbricate; underside of leaves dull green; median leaves short-aristate ...... *S. idiospora*
ff′. Rhizophores filiform; microspores rugose or spinulose.
j′. Leaves wrinkled above, herbaceous .... 12. *S. mollis*
jj′. Leaves smooth above, membranaceous .... 19. *S. schiedeana*

xx. Stems suberect; rhizophores confined to lower half of stem.
k′. Lateral leaves obliquely oblong.
l′. Rhizophores filiform; leaves membranaceous .... 3. *S. cladorrhizans*
ll′. Rhizophores stiff and straight; leaves herbaceous.
m′. Arista of median leaves less than half as long as leaves; median leaves denticulate; sporophylls dimorphous .... *S. stenophylla*
mm′. Arista of median leaves *usually* more than half as long as leaves; median leaves *usually* ciliate; sporophylls uniform .... 10. *S. martensii*
kk′. Lateral leaves ovate, subacute.
n′. Lateral leaves with 2 false nerves, usually pubescent in lower half; megaspores dull reddish brown .... 16. *S. porphyrospora*
nn′. Lateral leaves without false nerves, glabrous on upper surface; megaspores pale yellowish or white .... 12. *S. mollis*

1. **Selaginella apoda** (L.) Spring *in* Mart., Fl. Bras. 1(2):119. 1840.

—*Lycopodium apodum* L., Sp. Pl. 2:1105. 1753. —TYPE: "Habitat in Carolina, Virginia, Pensylvania," *Kalm s.n.* (LINN 1257.27). The specific epithet is often spelled "apus"; for discussion, see Morton, Amer. Fern J. 57:104–106. 1967.

ILLUSTRATIONS: Clute, Fern Allies N. Amer. 156, 157. 1905; Reeve, Rhodora 37:pls. 380, 381. 1935 (spores).

Stems prostrate, to ca. 0.4 mm diam., not articulate, neither flagelliform nor soboliferous, stramineous; rhizophores throughout, these filiform, ca. 0.1 mm diam.; leaves heteromorphic throughout, light green, membranaceous, glabrous; median leaves ovate, denticulate to entire along margin, acuminate at apex, with a narrow white margin 1 (2) cells wide; lateral leaves ovate, ca. 2 mm long, to 1.5 mm broad, acute at tip, denticulate; axillary leaves exauriculate; sporophylls monomorphic; strobili with 2 rows of megasporangia and 2 rows of microsporangia; microspores orangish, shed singly, warted; megaspores cream colored, with reticulate ridges; $2n = 18$ (Can.).

Bogs and marshes, also adjacent to Evergreen Cloud Forest; uncommon in Central Plateau; 2200–2700 m. Mexico (Hgo., Pue.); Can., E U.S. (Me. to Wis. south to Fla. and Tex. CHIAPAS COLLECTIONS: *GM 37* (BM! P, not seen, cited by Alston); *GM s.n.* (DS, labelled "Palenque," but this is doubtless a mislabelling); *L&S 9876* (US); *21287*; *22010*; *39780*.

2. **Selaginella chiapensis** A. R. Smith, Amer. Fern J. 70:25. 1980.

—TYPE: Mexico, Chiapas, Munic. Ocozocoautla de Espinosa, 18–20 km N of Ocozocoautla, *Breedlove 28159* (DS).

ILLUSTRATION: none.

Stems prostrate, to ca. 15 cm long, 0.7 mm diam. at the base, not articulate, dichotomously branched nearly throughout, neither flagelliform nor soboliferous, stramineous; rhizophores nearly throughout, 0.2–0.4 mm diam.; leaves heteromorphic throughout, green above, silvery beneath, herbaceous, mealy on upper surface; median leaves ovate, ciliate along margin, acuminate at apex, with a narrow (1 cell wide), inconspicuous white margin; lateral leaves oblong, 2.5–3.0 mm long, ca. 1 mm broad, rounded-acute at tip, ciliate (especially along acroscopic margin), spreading ca. 90°; axillary leaves exauriculate; sporophylls monomorphic; microspores light orange, shed singly, with high, narrow, anastomosing ridges on distal surface; megaspores not seen.

In Montane Rain Forest; rare in Northern Highlands; ca. 800 m. Known only from the type and from a slightly dissimilar specimen from the same area: *MC 2127* (BM, US).

Carlson 2127 differs from the type in having eciliate lateral leaves, acute rather than acuminate median leaves, and somewhat stouter rhizophores. Otherwise it is very similar to the type.

3. **Selaginella cladorrhizans** A. Braun, Ann. Sci. Nat. Bot. (5)3:282. 1865.

—SYNTYPES: Venezuela, "ad coloniam Tovar," *Moritz 448*; same locality, *Fendler 324*, pt. (presumably B).

ILLUSTRATIONS: Alston, J. Bot. 72:34. 1934; Vareschi, Fl. Venez. 1(1):pl. 9, fig. 3. 1969.

Stems prostrate to suberect, to ca. 0.4 mm diam., not articulate, flagelliform or not, not soboliferous; stem bases stramineous to pale green; rhizophores confined to base or nearly throughout, filamentous (0.1 mm diam.); leaves green on both sides, membranaceous, glabrous, smooth; median leaves ovate, long-acuminate to aristate at apex, entire to denticulate on margin, with a narrow white border; lateral leaves ovate, acute at apex, entire to denticulate, not pubescent on upper surface; axillary leaves exauriculate; strobili usually megasporangiate in basal portion; sporophylls dimorphous; microspores orange, shed singly, spinulose on distal face; megaspores white (ours), nearly smooth; $2n = 20$ (Trin.).

On rocks and banks in Tropical Rain Forest, Seasonal Evergreen Forest, Tropical Deciduous Forest, Savanna; locally common in Sierra Madre (lower elevation), Pacific Coastal Plain, edge of Central Depression, uncommon in Eastern Highlands; 450–1000 m. Western and S Mex. (Nay., Jal., Cma., Gro., Oax.), Bel., Guat., Pan., Ven.; Trin. CHIAPAS COLLECTIONS: *GM 192* (DS); *25606*; *31585*; *33958*; *37635B*; *37686*; *37789*; *38104*; *38422*; *38478*; *39135*.

I apply this name tentatively to Chiapas specimens, none of which match material identified by Alston from western Mexico. Chiapas specimens differ in having the main stems flagelliform as well as the lateral branches sometimes flagelliform; in addition, most specimens bear rhizophores throughout the length of the primary stem. There is some difficulty in separating Chiapas specimens of *S. cladorrhizans* from *S. flagellata*.

4. **Selaginella eurynota** A. Braun, Ann. Sci. Nat. Bot. (5)3:293. 1865.

—TYPE: Costa Rica, Aguacate, *Hoffmann 907* (presumably B; isotype K).

ILLUSTRATION: none found.

Stems trailing, ca. 1 mm diam., articulate, not flagelliform, stramineous to often reddish; rhizophores present along most of stem length, these up to 0.5 mm diam., sometimes reddish; leaves heteromorphous throughout, green, herbaceous, glabrous, smooth on upper surface; median leaves narrow-ovate, acuminate at apex, denticulate to ciliolate on margin, lacking a white border, with a single large auricle; lateral leaves oblong, to ca. 5 mm long, 1.0–1.5 (2.0) mm wide, rounded at apex, ciliolate to ciliate at least at the base and on incurved auricles; axillary leaves auriculate, the two auricles subparallel or incurved; strobili not seen, a single basal megasporangium (Hellwig, 1969); microspores beige, shed singly, spiny on all faces; megaspores white with narrow, high, anastomosing muri.

In Tropical Deciduous Forest, coffee-cacao plantations; uncommon in s Sierra Madre; 450–700 m. Southern Mex. (Chis. only?), Guat., Nic., C.R., Pan. Chiapas Collections: *22568*; *28620*; *31573*.

Paul Somers, who is currently studying the articulate species, has annotated Chiapas specimens as *S. horizontalis* (Presl) Spring var. *eurynota* (A. Br.) Somers; Somer's work is unpublished (Jan. 1981).

5. **Selaginella flagellata** Spring, Bull. Acad. Roy. Sci. Bruxelles 10(1): 228. 1843.

—Type: French Guiana, *Le Prieur s.n.*

Selaginella rhizophora Baker, J. Bot. 22:244. 1884. —Syntypes: Panama, near San Juan, *Seemann 29* (K); near Panama, *Seemann 32* (K).

Illustrations: Alston, J. Bot. 72:34. 1934; Vareschi, Fl. Venez. 1(1):pl. 12, fig. 1. 1969.

Stems prostrate, to ca. 0.8 mm diam., not articulate, flagelliform at apex and also side branches (ours), soboliferous, stem and leaves faintly pinkish at the very base (ours); rhizophores throughout, these filiform, 0.1 mm diam.; leaves heteromorphous throughout, green above, silvery green below, herbaceous, glabrous, smooth; median leaves narrow-ovate, long-acuminate to aristate at apex, denticulate along margin, with a narrow white border, exauriculate; lateral leaves ovate to ovate-oblong, ca. 2 mm long, 0.8 mm broad, acutish at apex, denticulate; axillary leaves exauriculate; strobili usually with a single basal megasporangium (ours), otherwise microsporangiate; sporophylls dimorphous; microspores orange, shed singly, spinulose on distal face; megaspores cream colored, minutely verrucose to smooth.

On banks in Seasonal Evergreen Forest; uncommon in s Pacific Coastal Plain; 200–550 m. Western and s Mex. (Cma., Oax.), Guat., Nic., C.R., Pan.; S.A. (to Bol. and Fr. Gui.); Trin., Tob. Chiapas Collections: *Fi 35398* (BM, US); *22557*; *22558*.

If the Chiapas specimens are correctly identified, *S. flagellata* is closely related to *S. hoffmannii*. The base of the stem shows a faint pinkish color. Both the apex and the side branches may be flagelliform, contrary to Alston (1955).

Breedlove 28528, from the same general locality as *22557*, is similar in most characters, but differs in erect stems lacking rhizophores and non-flagelliform apices. In Alston's key it comes to *S. californica* Spring, which it is not.

6. **Selaginella guatemalensis** Baker, J. Bot. 21:243. 1883.

—Lectotype (chosen by Alston, Bull. Brit. Mus. (Nat. Hist.) Bot. 1:245. 1955): Guatemala, Alta Verapaz, Cobán, *Salvin & Godman s.n.* (K).

Selaginella lehmannii Hieron., Hedwigia 43:33. 1904. —Type: Guatemala, Baja Verapaz, "prope Puxulá," *Lehmann 1329* (B; isotype BM).

Selaginella pansamalensis Hieron., Hedwigia 43:35. 1904. —Lectotype (chosen by Alston, op. cit.:244): Guatemala, Alta Verapaz, Pansamalá, *Tuerckheim s.n.* (Donn.-Smith ed. 653) (B; isolectotypes NY, P).

Illustration: Hemsley, Biol. Centr. Amer. 5:pl. 109. 1886.

Stems prostrate, to 1.5 mm diam., not articulate, neither flagelliform nor soboliferous, stramineous or pale green; rhizophores throughout, these stout, 0.4–0.5 mm diam.; leaves heteromorphous throughout, dark green above, lighter green or silvery green below, herbaceous, glabrous, faintly to decidedly wrinkled above; median leaves ovate, acuminate at apex, ciliate on margin, with a narrow white border, usually with a single ciliate auricle; lateral leaves oblong, ca. 3 mm long, 1 mm wide, rounded at apex, ascending to ca. 45° from stem (especially youngest ones), denticulate (younger) to short-ciliate (long-ciliate) (older); axillary leaves exauriculate; strobili usually with a single basal or subbasal megasporangium (occasionally 2–3 in same rank), otherwise microsporangiate; microspores pale orangish, shed singly, with narrow, high, spinulose ridges; megaspores white, rugose.

Terrestrial in Montane Rain Forest, Pine-Oak-Liquidambar Forest, less often in Seasonal Evergreen Forest; common in Eastern Highlands, se corner of Central Plateau, e edge of Northern Highlands; 800–1300 m. Southern Mex. (Oax.), Bel., Guat., Hond. Chiapas Collections: *MC 1728, 1849* (US); *GM 52 (DS)*; *GM 37-2hf* (DS); *Dr 1634* (MEXU, US); *21159*; *22126*; *22329*; *29870*; *32161*; *32269*; *32905*; *38776*.

7. **Selaginella hoffmannii** Hieron., Hedwigia 41:184. 1902.

—Syntypes: 18 specimens cited from Costa Rica, Guatemala, and Mexico (Veracruz).

Illustration: none found.

Stems erect, to 2 mm diam., 45 cm long, not articulate, not flagelliform or occasionally side branches flagelliform, soboliferous; stem bases pink to reddish; rhizophores only at stem base, these filamentous to stout; leaves dark green above, lighter green below, herbaceous, glabrous, smooth; median leaves narrow-ovate, long-acuminate at apex, denticulate along margin, with a narrow white border; lateral leaves ovate-oblong, to ca. 3 mm long, 1 mm wide, acutish at apex, entire to denticulate; axillary leaves exauriculate; strobili with a single basal megasporangium or several basal to subbasal megasporangia in two rows; microspores orange, shed singly, spinulose on distal face, the spinules often connected by narrow anastomosing ridges; megaspores white, nearly smooth.

Terrestrial and on rocks in Lower Montane and Montane rain forests, Pine-Oak-Liquidambar Forest, Pine-Oak Forest, Seasonal Evergreen Forest; common in Sierra Madre, edge of Central Depression, Northern and Eastern highlands, Central Plateau; 550–1350 m. Western and s Mex. (Sin., Cma., Jal., Mich., Gro., Oax., Ver.), Guat., Salv., Hond., Nic., C.R. Chiapas Collections: *G 606* (BM); *R 869* (PH); *P 7220* (US); *P 7222* (UC, US); *GM 163* (DS); *6363*; *7689*; *22131*; *22254*; *22272*; *25605*; *28341*; *28732*; *32323*; *32466*; *32520*; *32854*; *32992*; *37776*; *38143*; *38284*; *38525*; *38624*; *38932*; *40119*; *40127*; *42013*; *42447*.

Several collections (e.g., *28341*; *32854*; *33889*; *38143*) have flagelliform side branches, a character not mentioned by Alston (1955); in this feature and others, *S. hoffmannii* approaches *S. flagellata*, which is prostrate and rhizophorous throughout. I believe the two are closely related.

8. **Selaginella huehuetenangensis** Hieron., Hedwigia 43:32. 1904.

—Syntypes: Guatemala, Huehuetenango, "inter Santa Cruz Almor et Ixcan," *Bernoulli & Cario 178*; Alta Verapaz, "inter Dolores et Jachichá," *Bernoulli & Cario 183* (B).

Illustration: **Fig. 82.**

Similar to *S. guatemalensis*, but distinguished by the median leaves aristate, arista usually half or more length of lamina; median leaves with a narrow to broad white margin; lateral leaves long-ciliate, generally shorter, mostly ca. 2 mm long or less.

Terrestrial in Tropical Rain Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands, s Sierra Madre; 350–1400 m. Southern Mex. (Chis. only), Bel., Guat., Hond., Nic., C.R., Pan. Chiapas Collections: *GM 2* (DS); *GM 39* (DS, US); *GM 162* (DS); *EM 2782* (MEXU, US); *EM 3702* (MEXU, US); *32475*; *33161*.

Most closely related to *S. guatemalensis*.

9. **Selaginella lindenii** Spring, Bull. Acad. Roy. Sci. Bruxelles 10(1):142. 1843.

—Type: Mexico, Tabasco, Teapa, *Linden s.n.* (P, isotype BM!; *Linden 1599*, K, is probably from the same gathering).

Illustration: none found.

Stems prostrate, to 0.6 mm diam., not articulate, neither flagelliform nor soboliferous, stramineous or pale green; rhizophores throughout, filiform, 0.1–0.2 mm diam.; leaves heteromorphous throughout, green above, light green or silvery green below, herbaceous, pubescent above, wrinkled; median leaves suborbicular-ovate, acuminate at apex, ciliate on margin, with a broad white border, exauriculate; lateral leaves ovate, to 2 mm long, 1 mm broad, acute at apex, ciliate; axillary leaves exauriculate; strobili with 2 rows of megasporangia and 2 rows of microsporangia; microspores pale orange, shed singly, with narrow, high, anastomosing, spinulose ridges; megaspores white.

On cliff faces and wet rocks in Seasonal Evergreen Forest; rare in Northern Highlands; 1200 m. Known only from s Mexico (Oax., Tab., and Chis.). Chiapas Collection: *24183*.

10. **Selaginella martensii** Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24(1):129. 1850.

—Syntypes: Mexico, Oaxaca, *Galeotti 6608, 6618*; Veracruz, "prope Jalapam et Mirador," *Galeotti 6606*; Sierra San Pedro Nolasco, *Jurgensen* (K).

Selaginella solmsii Baker, Handb. Fern-Allies 56. 1887. —Type: Guatemala, Costa Grande, *Bernoulli & Cario 181* (K).

Illustrations: Goebel, Organogr. Pfl., ed. 2, 1:110, 246. 1913; Gregory & Riba (1979:31).

Stems suberect to erect, to 2.5 mm diam., not articulate, neither flagelliform nor soboliferous, stramineous to pale green; rhizophores in lower ⅓ (½), these stout, to 1 mm diam.; leaves dark green above, lighter green below, herbaceous, glabrous, smooth and shining above; median leaves ovate, usually long-aristate, aristae to ca. ½ lamina length, infrequently short-aristate or acuminate, denticulate to ciliate on margin, with a very narrow white border (or lacking border), auriculate; lateral leaves oblong, to 6 mm long, 1–3 mm broad, rounded at apex, entire to denticulate to ciliate; axillary leaves exauriculate; strobili usually megasporangiate in basal half or entirely microsporangiate; microspores beige to orangish, shed mostly in tetrads, with low verrucose markings; megaspores beige to cream colored, verrucose; $2n = 60$ (cult.).

In Montane Rain Forest, Pine-Oak-Liquidambar Forest, Evergreen Cloud Forest; relatively common in Central Plateau, s Sierra Madre, uncommon in Northern Highlands; (550) 1250–2700 m. Southern Mex. (S.L.P., Ver., Oax.), Guat., C.R., Pan. Chiapas Collections: *P 7220* (BM, NY, UC, US); *EM 226* (K, US); *GM 132* (DS, US); *GM 133* (DS); *6218*; *7051*; *14901*; *27799*; *28731*; *29254*; *31713*; *32322*; *32839?*; *33634*; *38313?*; *41085*; *42499*.

Two collections from lower elevations in the Northern Highlands (*32839*; *38313*) are referred here provisionally; they differ from typical material of *S. martensii* in having the median leaves acuminate or short-aristate and denticulate along the margin (rather than ciliate).

Scanning electron micrographs of spores can be seen in a paper by A. Tryon and Lugardon (Pollen et Spores 20:315–340. 1978).

11. **Selaginella microdendron** Baker, J. Bot. 23:116. 1885.

—Type: Cuba, *Wright 3910* (K; isotype BM).

Selaginella harrisii Underw. ex Urban, Symb. Antill. 7:162. 1912. —Syntypes: 5 collections cited from Jamaica and 1 from Mexico, Yucatán, which Hieronymus made the type of *S. millspaughii*.

Selaginella millspaughii Hieron., Hedwigia 58:285. 1917. —Type: Mexico, Yucatán, near Chichen Itzá, *Millspaugh 1620* (B; isotype BM).

Selaginella enckei Nessel, Repert. Spec. Nov. Regni Veg. 48:172. 1940. —Type: Mexico, Yucatán, "unter Campecheholzbäumen in der Nähe des Kap Catoche, *Baqueiro*."

Illustration: none found.

Most similar to *S. pallescens* and *S. pulcherrima*, differing from the former in the generally more frondose branch systems (rarely rosette-forming), not so tightly caespitose; old leaves drying light reddish brown; youngest leaves more strongly imbricate, dark green above, dull green beneath (not silvery); $2n = 20$ (cult.). See *S. pulcherrima* for differences between that species and *S. microdendron*.

Terrestrial or occasionally on rocks in Lower Montane and Montane rain forests, Seasonal Evergreen Forest, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands; 600–1700 m. Eastern and s Mex. (Tam., Ver., Oax., Yuc.), Bel., Guat.; Cuba, Jam. Chiapas Collections: *T&L 41356* (DS); *H&S 20079* (US); *S 1704* (MEXU, US); *13390*; *21567*; *21941*; *23363*; *27527*; *32534*; *33052*.

12. **Selaginella mollis** A. Braun, Ann. Sci. Nat. Bot. (5)3:276. 1865.

—Type: Colombia, prov. Ocana, 4000–6000 ft, *Schlim 1029* "in coll. Lindeniana h. Boiss." (G).

Illustration: none found.

Stems prostrate to suberect, to 2.5 mm diam., not articulate, flagelliform or not, soboliferous, stramineous; rhizophores usually throughout, occasionally confined to basal third of main stem, filiform (0.1 mm diam.) to sometimes stout at base of main stem; leaves heteromorphous throughout or monomorphous at stem base, dark green above, silvery green below, herbaceous, glabrous, decidedly wrinkled above; median leaves ovate, acuminate to short-aristate, ciliate on margin, with narrow white border, with a small auricle or exauriculate;

lateral leaves ovate to oblong, to ca. 2 mm long, 0.8 mm broad, acutish at apex, ciliate on margin; axillary leaves exauriculate; strobili with megasporangia occupying basal part of 2 rows or seemingly scattered; microspores orange, shed singly, with thin spinules on distal face; megaspores white, with short, narrow, anastomosing ridges on distal face.

On rocks and along streams in Tropical and Lower Montane rain forests, Seasonal Evergreen Forest; locally common in Northern Highlands (but not Jitotol Ridge), Gulf Coastal Plain; 150–700 (1200) m. Southern Mex. (Oax., Tab.), Bel., Nic., Pan.; S.A. (Col.). Chiapas Collections: *G 603* (BM, YU); *G 604* (BM; K, not seen); *G 605* (BM); *GM 16* (P, not seen, cited by Alston as from San Cristóbal, which is probably a mislabelling); *EM 3691* (MEXU, US); *13556*; *20735*; *20767*; *24170*; *26607*; *28874*; *32855*; *32856*; *35031*; *38312*; *38317*.

This species and to a lesser extent a few others in Mexico (e.g., *S. guatemalensis*, *S. huehuetenangensis*) have decidedly wrinkled leaves when dried. Alston does not mention this character, but I believe it is an excellent one for certain species.

13. **Selaginella novae-hollandiae** (Swartz) Spring, Bull. Acad. Roy. Sci. Bruxelles 10(1):234. 1843.

—*Lycopodium novae-hollandiae* Swartz, Syn. Fil. 184, 410. 1806. —Type: uncertain, original publication not seen.

Illustration: no good one found.

Stems prostrate to suberect, to ca. 0.5 mm diam., not articulate, not flagelliform, soboliferous; stem bases stramineous to pale green; rhizophores mostly filiform, 0.1–0.2 (0.3) mm diam.; leaves green, herbaceous, glabrous, smooth, shining above; median leaves ovate, long-acuminate at apex, ciliolate on margin, with narrow white border, auriculate; lateral leaves ovate, to ca. 2.5 mm long, 1.8 mm wide, rounded-acute at apex, entire to denticulate to ciliolate on older leaves; axillary leaves exauriculate; strobili mostly microsporangiate with a few scattered megasporangia (not necessarily basal); microspores orange, shed in tetrads, verrucose (ours); megaspores beige, slightly verrucose.

In Tropical Rain Forest; uncommon in E edge of Northern Highlands; 300 m. Southern Mex. (Chis. only), Nic., C.R., Pan.; S.A. (Col. to Arg.). Chiapas Collections: *GM s.n.* (DS); *35378*; *35379*, pt.

The Chiapas plants are only weakly soboliferous, but otherwise they agree with specimens from Costa Rica, e.g., *Stork 2474* (UC). Hellwig (1969) described the microspores of a Panamanian specimen as bearing capitate projections; Alston (1955) stated that the microspores of *S. novae-hollandiae* were smooth. Evidently there is considerable variation in microspore ornamentation in the species as it is currently circumscribed.

14. **Selaginella oaxacana** Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24(1):177. 1850.

—Type: Mexico, Oaxaca, Chinantla, *Galeotti 6608bis* (P, photo BM!).

Lycopodium flabellatum L. var. *strictum* Mart. & Gal., Nouv. Mém. Acad. Roy. Sci. Bruxelles 15(5):12. 1842. —Type: Mexico, Oaxaca, *Galeotti 6608* (BR, photo BM!).

Selaginella wendlandii Hieron. *in* Engl. & Prantl, Nat. Pflanzenfam. 1(4):683. 1901. —Lectotype (chosen by Alston, Bull. Brit. Mus. (Nat. Hist.), Bot. 1:237. 1955): Costa Rica, San Miguel, *Wendland 771* (B; isotype W).

Illustration: none found.

Stems erect, to ca. 3 mm diam., 90 cm long, not articulate, not flagelliform, soboliferous, stramineous to pale green; rhizophores only at immediate base, stout, to 1 mm diam.; leaves homomorphous on main stem up to at least lower several branches; leaves dark green on both sides, herbaceous, glabrous, smooth above; median leaves ovate, acuminate to short-aristate at apex, denticulate, without white border, with a single small auricle; lateral leaves ovate-oblong, to 5 mm long, 2 mm broad, rounded at apex, truncate along lower margin at base, entire; axillary leaves exauriculate; strobili megasporangiate in proximal half or more, microsporangiate in distal half or less, occasionally a few basal microsporangia; microspores beige, ± smooth to slightly verrucose, shed singly; megaspores white, ± smooth; $2n = 18$ (C.R.).

In Montane Rain Forest; uncommon in Northern Highlands (Jitotol Ridge); 1700 m. Southern Mex. (Oax.), Guat., Hond., C.R., Pan.; Col.? Chiapas Collections: *GM 54* (DS; P, not seen, according to Alston, labelled as collected in San Cristóbal, which is probably erroneous); *R 868* (NY, not seen; PH, seen); *G 602* (BM; K, not seen); *32599*.

15. **Selaginella pallescens** (Presl) Spring *in* Mart., Fl. Bras. 1(2): 132. 1840.

—*Lycopodium pallescens* Presl, Rel. Haenk. 1:79. 1825. —Type: Mexico, *Haenke s.n.* (PR—photo BM!).

Lycopodium cuspidatum Link, Hort. Berol. 2:161. 1833. —*Selaginella cuspidata* (Link) Link, Fil. Spec. 158. 1841. —Type: a cultivated plant, said to be from Mexico (B?).

Selaginella cuspidata var. *elongata* Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24(1): 67. 1850. —Type: Guatemala, collector not stated.

Illustrations: Knobloch & Correll, Ferns Chih. 21. 1962; Vareschi, Fl. Venez. 1(1):pl. 14, fig. 1. 1969.

Stems caespitose, sometimes rosette-forming, more often frondose, not articulate, neither flagelliform nor soboliferous; stem bases covered with overlapping dead leaves, these long-ciliate, drying tan; rhizophores absent; leaves homomorphous on main stem, otherwise heteromorphous, green to often yellowish green above, silvery green beneath, herbaceous to subcoriaceous, glabrous; median leaves ovate, acuminate at apex, ciliolate on margin, with a pronounced, relatively broad white border; lateral leaves ovate, mostly 1.5–3 mm long, 1.5 mm broad, ciliate; axillary leaves exauriculate; strobili with one to several basal or subbasal megasporangia (sometimes basal half); microspores orangish red, shed singly, with short-capitate papillae; megaspores yellow to beige, with thin, low, veinlike, reticulate ridges; $2n = 20$ (cult.).

On rocks and rocky slopes in or adjacent to Tropical Deciduous Forest, Seasonal Evergreen Forest, Pine-Oak Forest, Pine-Oak-Liquidambar Forest, Savanna, rarely Oak-Drimys Forest; common in Sierra Madre, Central Depression, Northern Highlands, Central Plateau, Pacific Coastal Plain; 100–2200 (2700) m. Nearly throughout Mex. (Son., Chih., N.L., Tam., Sin., Dgo., S.L.P., Nay., Jal., Ver., Cma., Mich., D.F., Méx., Mlos., Gro., Oax.), Bel., Guat., Hond., Salv., Nic., C.R., Pan.; S.A. (Col., Ven.). Chiapas Collections: *RMK 2755* (DS, UC, US); *A 1383* (UC); *A 1338* (UC, US); *La 1072* (DS); *G 608* (BM, not seen); *EM 1727* (MEXU, US); *EM 229* (MEXU, US); *R&R 2088* (MEXU, US); *GM 59* (DS, US); *GM 71* (DS); *A 1273* (UC); *GM s.n.* (DS); *T 2895* (DS); *EM 1900* (MEXU, US); *8172*; *13712*; *14475*; *19853*; *20474*; *20601*; *21538*; *22421*; *23251*; *23686A*; *23966*; *26235*; *26391*; *26967*; *27032*; *27149*; *27743*; *31425*; *32018*; *32740*; *36541*; *36817*; *37547*; *38416*; *38591*.

This species exhibits a wide range of habits, from tufted or rosette forms to rather frondose forms. In Chiapas, it can be confused only with *S. microdendron*.

16. **Selaginella porphyrospora** A. Braun, Ann. Sci. Nat. (5)3:286. 1865.

—Type: Mexico, Veracruz [probably Mirador], *Sartorius s.n.* (B; fragment BM!).

Selaginella binervis Liebm. ex Fourn., Mex. Pl. 148. 1872 (in syn.).

Selaginella bernoullii Hieron., Hedwigia 41:192. 1902. —Syntypes: Guatemala, Quiché, inter Cubulco et Joyabaj, *Bernoulli 1121*; *Bernoulli & Cario 160* (presumably B).

Illustration: none found.

Stems prostrate to usually suberect, to 0.5 mm diam., not articulate, flagelliform or not, usually soboliferous; stem bases stramineous; rhizophores usually confined to basal third, filamentous; leaves yellowish green to green, darker above, membranaceous, the lateral ones usually short-pubescent above, infrequently glabrous; median leaves narrow-ovate, long-acuminate at apex, entire to denticulate on margin, with a narrow white border; lateral leaves ovate, to ca. 3 mm long, 1 mm wide, entire to denticulate; axillary leaves exauriculate; strobili usually with basal or subbasal megasporangia, occasionally entirely megasporangiate; sporophylls dimorphous; microspores red-orange, shed singly, spinulose on distal face; megaspores tan to orangish tan (ours), nearly smooth.

On wet banks adjacent to Montane Rain Forest, Evergreen Cloud Forest; common in s Sierra Madre, less so in Northern Highlands (Jitotol Ridge); (1250) 1700–3000 m. Southern Mex. (Jal., Hgo., Ver., Mich., Méx., Mlos., Pue., Oax.), Guat., Hond., Salv., Nic., C.R., Pan. Chiapas Collections: *P 6720* (BM, UC, US); *P 6721* (BM, UC, US); *EM 2468* (MEXU); *GM 136* (DS); *19967*; *22688*; *22825*; *22847*; *24378*; *29437*; *31859*; *31894*; *32339*; *32680*; *40118*; *40124*; *40220*; *42548*.

Certain specimens of *S. porphyrospora* seem to be nearly or entirely devoid of pubescence on the upper surface of lateral leaves (e.g., *24378*; *31859*). Alston (1955) also observed lack of pubescence on some Costa Rican specimens.

Selaginella porphyrospora appears to be variable with regard to sex expression in the strobili. Some specimens (e.g., *32339* and *32680* from the Northern Highlands) have entirely megasporangiate strobili.

17. **Selaginella pulcherrima** Liebm. ex Fourn., Mex. Pl. 1:147. 1872.

—Lectotype (chosen by Alston, Bull. Brit. Mus. (Nat. Hist.), Bot. 1:239. 1955): Mexico, Veracruz, Hacienda de Jovo, Liebmann Pl. Mex. 2061 (C; *Liebmann s.n.* at BM! K, US). It would seem that this lectotypification is impermissible, since Fournier probably never saw material at C.

Illustration: Gager, Fundam. Bot. 383. 1916 (as *S. amoena* Bull).

Rhizomes long-creeping; stems erect or arching, not caespitose, mostly 35–50 cm long, not articulate, neither flagelliform nor soboliferous; stem bases stramineous; rhizophores absent; leaves dark green above, lighter green below, herbaceous, glabrous, ± smooth, the oldest ones turning buff; medial leaves ovate, long-acuminate at apex, denticulate to ciliolate on margin, lacking a prominent white border, or narrowly and indistinctly white-bordered; lateral leaves ovate, to ca. 2.0 mm long, 1.5 mm broad, acute at apex, denticulate to ciliolate on margin; axillary leaves exauriculate; strobili with basal megasporangia, these few; microspores deep orange to orange-red, shed singly, with stout papillae on distal face; $2n = 20$ (cult.).

Terrestrial in Pine-Oak-Liquidambar Forest, Montane Rain Forest, less often in Evergreen Cloud Forest, Seasonal Evergreen Forest; relatively common in Northern Highlands (especially Jitotol Ridge), Central Plateau, Sierra Madre; 1000–2100 (2700) m. Southern Mex. (Ver.). Chiapas Collections: *GM 53* (DS); *GM 131* (DS); *GM 163*, pt. (DS); *EM 3943* (MEXU); *G 607* (YU); *8969*; *14958*; *21115*; *21429*; *22352*; *23131*; *24981*; *29205*; *29071*; *30064*; *32147*; *32316*; *32730*; *34376*; *34609*; *42097*.

I am uncertain as to the application of the epithet "pulcherrima" to Chiapas specimens. *Selaginella pulcherrima* was known to Alston (1955) by the type collection, *Conzatti 807* from the same area, and numerous cultivated specimens. It seems to be a rather common species in Chiapas. Specimens have been determined previously as *S. illecebrosa* and *S. pallescens*. It may be most closely related to *S. microdendron*, from which it differs in the rhizome long-creeping (vs. short-creeping), obscure white margin of medial leaves (vs. prominent white margin), youngest lateral and median leaves barely or not at all overlapping (vs. rather strongly overlapping) and denticulate to ciliolate (vs. prominently ciliate). *Selaginella pulcherrima* also seems to grow in wetter and more forested habitats than does *S. microdendron*. I see no close relationship between *S. illecebrosa* and *S. pulcherrima*.

18. **Selaginella reflexa** Underw., Bull. Torrey Bot. Club 21:268. 1894.

—Syntypes: Mexico, Jalisco, near Guadalajara, 28 Sept. 1889 [24 Sept., fide Pringle's diary], also in 1893 [20 Sept.], *Pringle 2635* (presumably NY; isosyntypes BM! UC! US).

Selaginella carioi Hieron. *in* Engl. & Prantl, Nat. Pflanzenf. 1(4):688. 1901. —Syntypes (cited in Hedwigia 41:198. 1902); Guatemala, Dept. Zacapa, "Río Motagua inter Barbesco et Gualau *Bernoulli 955*" (fragm. BM!); same locality, *Bernoulli & Cario 154*; Dept. Alta Verapaz, Río Chisoy, *Bernoulli & Cario 172*; same locality, *Bernoulli 1087* (presumably B).

Illustration: none found.

Stems prostrate, to 0.4 mm diam., not articulate, neither flagelliform nor soboliferous; stem bases stramineous to pale green; rhizophores throughout, these filamentous; leaves dark bluish green above (ours), herbaceous to subcoriaceous (ours), glabrous, smooth; median leaves suborbicular (ours), short-aristate at apex, ciliate along margin, with a very broad white border; lateral leaves ovate, to 1.3 mm long (ours), 0.8 mm broad, rounded at apex, denticulate to ciliate on margin, with a stellate fascicle of hairs on an apophysis at point of attachment of leaf to stem (seen from below); axillary leaves exauriculate; strobili megasporangiate at base; microspores deep orange, shed singly, with a few short stout spinules (ours); megaspores yellow, rugose.

Canyons and dry slopes in Tropical Deciduous Forest; uncommon in Central Depression, Northern Highlands; 800–1000 m. Southern Mex. (S.L.P., Jal., Gro.), Guat. Chiapas Collections: *30303*; *36540*; *37259*.

Chiapas specimens of *S. reflexa* differ from the type and all other Mexican material I have seen in having very closely imbricate lateral and medial leaves, in having a wider white border on the medial leaves, in their bluish-green color, and in the fascicle of hairs at the base of lateral leaves. In these characters, they match an isotype of *S. carioi* that I have seen.

19. **Selaginella schiedeana** A. Braun, Index Sem. Hort. Berol. 1857:App. 14. 1858? (not seen); Ann. Sci. Nat. Bot. (4)13:62. 1860.

—TYPE: Mexico, Veracruz, Papantla, *Schiede & Deppe s.n.* (presumably B; isotype BM).

ILLUSTRATION: none found.

Stems prostrate, 0.2–0.3 mm diam., not articulate, neither flagelliform nor soboliferous; stem bases stramineous; rhizophores throughout, these filamentous; leaves green to yellow-green, membranaceous (herbaceous), glabrous, smooth; median leaves ovate, acuminate at apex, ciliolate on margin, with a narrow whitish border; lateral leaves short-oblong, to 2 mm long, 1.3 mm broad, not overlapping back from stem tips, rounded to subacute at apex, denticulate to ciliate at margin, lacking a fascicle of stellate hairs at juncture with stem; axillary leaves exauriculate; strobili with a single (to few) basal megasporangium(a); microspores bright orange, shed singly, with short, broad papillae on all faces; megaspores yellow, rugose.

In Pine-Oak-Liquidambar Forest, Lower Montane Rain Forest, Seasonal Evergreen Forest; uncommon in Northern Highlands; 700–1350 m. Southern Mex. (S.L.P., Ver.). CHIAPAS COLLECTIONS: *21561*; *32535*; *38716*.

This species seems to be a close relative of *S. reflexa*, differing by the medial leaves not so strongly white-bordered, longer and less numerous cilia on these leaves, thinner leaves that are not so conspicuously overlapping, and greenish (rather than bluish green) color. None of the Chiapas collections match exactly those collections that I have seen from elsewhere in Mexico, but I believe they are conspecific.

20. **Selaginella schizobasis** Baker, J. Bot. 21:333. 1883.

—TYPE: Mexico, Chiapas, *Ghiesbreght 605* (K; isotype NY!).

ILLUSTRATION: none found.

Stems trailing, ca. 1–2 mm diam., articulate, not flagelliform at apex, stramineous; rhizophores along entire length of main stems, mostly 0.3–0.6 mm diam.; leaves heteromorphous throughout, green, oldest ones sometimes reddish, smooth on upper surface; median leaves narrow-ovate, acuminate at apex, minutely ciliolate to denticulate on margin, with a single large basal auricle; lateral leaves usually spreading at right angles or nearly so, oblong, mostly 3.5–5.0 mm long, 1–2 mm wide, rounded to acutish at apex, entire to denticulate on margins; axillary leaves with two diverging auricles; strobili with a single basal megasporangium; microspores beige, shed singly, spiny; megaspores with low, anastomosing muri.

In Tropical, Lower Montane, and Montane rain forests, Pine-Oak-Liquidambar Forest; scattered in Northern and Eastern highlands; 300–1350 m. Southern Mex. (Ver., Tab., Oax.), Bel., Guat., Hond., Nic. CHIAPAS COLLECTIONS: *EM 3676* (K, not seen; UC); *13607*; *22269*; *22444*; *32570*; *33148*; *34123*; *38009*; *38233*.

All Chiapas specimens cited have been determined recently (Jan. 1978) by Somers as *S. sertata*. This species is certainly closely related, but seems to differ consistently in a suite of characters. *Selaginella schizobasis* has larger, more strongly divergent auricles on axillary leaves, lack of flagelliform stem tips, lateral leaves directed at right angles, leaves heteromorphous throughout, and more creeping stems with rhizophores throughout. In Chiapas and seemingly also Mexico, they also differ in distribution, with *S. schizobasis* occurring in eastern Mexico, *S. sertata* in western Mexico.

21. **Selaginella sertata** Spring, Nouv. Mém. Acad. Roy. Sci. Bruxelles 24(1):104. 1850.

—TYPE: "Panama" [Costa Rica, Nicoya], *Sinclair s.n.* [49?] (K).

Selaginella nicaraguensis Baker, J. Bot. 21: 333. 1883. —TYPE: "Guatemala, in forests of Grenada" [Nicaragua], *Levy 360* (K).

ILLUSTRATION: Hemsley, Biol. Centr. Amer. 5:pl. 109. 1886.

Stems trailing or curving upwards, mostly ca. 1 mm diam. or less, articulate, flagelliform at apex, stramineous to sometimes reddish; rhizophores present in basal third (sometimes more), also sometimes along flagelliform tip, 0.2–0.5 mm diam.; leaves homomorphous below first stem branch and sometimes at base of ascending side branches, otherwise heteromorphous, green to often yellowish green, oldest ones sometimes reddish, glabrous, smooth on upper surface; median leaves narrow-ovate, acuminate to short-aristate at apex, minutely ciliolate to denticulate on margin, with a single large basal auricle; lateral leaves usually directed upwards, oblong, to ca. 4 mm long, 1 mm broad, acutish at apex, entire to ciliolate; axillary leaves exauriculate or obscurely auriculate with ± parallel auricles; strobili with a single basal megasporangium; microspores beige, shed singly, spiny; megaspores cream with high, narrow, anastomosing muri.

In Seasonal Evergreen Forest; uncommon in Pacific Coastal Plain, lower elevations of Sierra Madre and its interface with Central Depression; 200–750 m. Western and s Mex. (Sin., Nay., Jal., Cma., Mich., Gro., Oax., Camp.), Guat., Salv., Hond., Nic., C.R., Pan. CHIAPAS COLLECTIONS: *Voorhies & Sanchez 68-19* (DS); *22555*; *38142*.

Alston (1955) commented that prolonged stem apices of this species often produce plants that have leaves of a much thicker texture. I find this to be true of most Mexican material I have seen. See *S. schizobasis* for additional discussion.

22. **Selaginella silvestris** Asplund, Ark. Bot. 20A(7):30, figs. 3–5. 1926.

—TYPE: Bolivia, "prov. Sur Yungas, ad El Chaco," 1900 m, *Asplund 1140* (UPS or S).

ILLUSTRATION: only the original.

Stems trailing, mostly ca. 0.8–1.5 mm diam., articulate, not flagelliform, stramineous; rhizophores present along most (at least ⅔) of stem length, these ca. 0.3 mm diam.; leaves heteromorphous throughout, green, thin-herbaceous, glabrous, smooth on upper surface; median leaves narrow-ovate, aristate at apex (aristae ca. ⅓ blade length), entire to minutely ciliolate along margin, lacking white margin, biauriculate, the auricles subequal, short; lateral leaves oblong, 3–4 mm long, mostly 1.0–1.5 mm wide, rounded at apex, ± entire; axillary leaves exauriculate; strobili entirely microsporangiate or with a single basal megasporangium; microspores beige, shed singly, with spines limited to distal face; megasporangia cream with high, thin, anastomosing muri.

In Evergreen Cloud Forest, Montane Rain Forest; scattered in Central Plateau, s Sierra Madre; 1800–2800 m. Southern Mex. (Hgo., Ver., Oax.), Guat., Hond., C.R., Pan.; S.A. (to Bol.). Chiapas Collections: *GM 73* (DS, US, labelled "Palenque," which is probably erroneous); *EM 2911* (K, not seen, cited by Alston); *T 1985* (DS); *8166*; *9288*; *15240*; *22032*.

In Chiapas, this species occurs at higher elevations than other articulate species.

23. **Selaginella stellata** Spring *in* Endlicher & Mart., Fl. Bras. 1(2):129, pl. 8. 1840.

—Syntypes: Brazil, *Hoffmannsegg* (B—Herb. Willd. 19392-1); Brazil, Para, "prope Obidos," *Martius s.n.* (M); Brazil, *Sieber s.n.* (comm. Hoffmannsegg) (B).

Selaginella galeottii Spring, Bull. Acad. Roy. Sci. Bruxelles 10(1):230. 1843. —Lectotype (chosen by Gregory & Riba, 1979): Mexico, *Galeotti* [*6606*] (P, photo BM); the other syntype is from Bolivia, *d'Orbigny*.

Illustrations: original; also Harvey-Gibson, Ann. Bot. 16:pl. 20, fig. 7. 1902.

Stems erect to upcurved, to 3 mm diam., articulate, neither flagelliform nor soboliferous, stramineous to pale green; rhizophores present only in basal third or less, these stout, to 1.2 mm diam.; leaves heteromorphous above the first branches, green, herbaceous, glabrous, smooth on upper surface; median leaves narrow-ovate, acuminate at apex, entire to denticulate, lacking a white margin, biauriculate, the auricles relatively large (to ¼ the lamina), subequal; lateral leaves ovate-oblong, to 6 mm long, 2.5 mm broad, rounded-acute at apex, entire; axillary leaves exauriculate; strobili with a single basal megasporangium, otherwise microsporangiate; microspores beige, shed singly, with numerous thick spines on all faces; megaspores beige with whitish, anastomosing ridges; $2n = 20$ (cult.).

In Montane Rain Forest, Pine-Oak-Liquidambar Forest, less often in Evergreen Cloud Forest, Lower Montane Rain Forest; relatively common in Sierra Madre, Northern Highlands, Central Plateau; (900) 1300–2200 m. Southern Mex. (Ver., Oax.), Bel., Guat., C.R. Chiapas Collections: *Nelson 3348* (US); *EM 2440* (K, not seen, US); *GM 31* (DS); *14810*; *14902*; *16143*; *24068*; *24406*; *25085*; *31513*; *31650*; *32124*; *32369*; *32473*; *38858*; *42536*.

Micro- and megaspores of this species have been illustrated (SEM) by Tryon and Lugardon (Pollen et Spores 20:315–340. 1978).

24. **Selaginella steyermarkii** Alston, Ann. Mag. Nat. Hist. (12)7:638, pl. 12. 1954.

—Type: Guatemala, Huehuetenango, between San Sebastián Hacienda and large peñasco above town, *Steyermark 50501* (BM).

Illustration: Tryon (1955:pl. 2, figs. 22, 23).

Stems prostrate, irregularly ascendant; rhizophores throughout, these stout, ca. 0.4 mm diam., brown; older, primary branches 1–2-pinnate; leafy stems strongly dorsiventral in position of upper and lower leaves; all leaves subulate to subulate-long-triangular, to ca. 3 mm long, 0.3 mm wide, apex long-acuminate to aristate, the terminal seta ¼–⅓ as long as blade; leaves coriaceous, with base abruptly adnate, distinct from stem in color, margins ciliate, longest cilia ¼–½ as long as width of blade; some leaves, especially the oldest living and youngest dead ones, reddish or with reddish blotches; sporophylls in 4 ranks, with margins ciliate to short-ciliate; megaspores finely to moderately rugose-reticulate.

Slopes and dry ravines; uncommon in s Sierra Madre and where it meets Central Depression, Northern Highlands; 1100–1600 m. Southern Mex. (Chis. only), Guat. Chiapas Collections: *Gi 4252*, *4257* (NY); *EM 1846* (US); *40588*; *41805*.

Tryon (1955:49) commented on the reddish leaves of this species, these being most frequent "among the oldest living leaves and the youngest dead ones." This is especially noticeable on *Breedlove 41805*.

Species to Be Looked for in Chiapas

Selaginella convoluta (Arn.) Spring —Mex. (Yuc.), Guat., Hond.; S.A. (to Parag. and Bol.); Cuba, Hisp. Stems tufted, curling inwards when dry; similar to tufted forms of *S. pallescens*, but median leaves not white-margined.

Selaginella delicatissima Linden ex A. Braun —Mex. (N.L., Tam., S.L.P., Jal., Hgo., Ver., Cma., Mich., Mlos., Gro., Oax.), Guat. Stems prostrate, rooting throughout; leaves dimorphous throughout; median leaves denticulate; dead leaves often tinged with red.

Selaginella idiospora Alston —Guat., Hond. Similar to *S. guatemalensis* and *S. huehuetenangensis*, but the lateral leaves spreading at a 90° angle; median leaves ± orbicular, short-aristate. I am not convinced that the character of spreading lateral leaves is sufficient to distinguish this species from its very close relatives.

Selaginella illecebrosa Alston —Mex. (Tab.), Guat., Hond. Main stems erect, with uniform (not dimorphic) leaves; median leaves not white-margined; lateral leaves dimorphous throughout frondlike portion. Of our species, most similar to *S. pulcherrima*, but lateral leaves on main stem and primary branches oblong (vs. ovate).

Selaginella kunzeana A. Braun —Mex. (Dgo., Cma., Méx.), C.R., S.A. (to Peru). Articulate prostrate stems, with axillary leaves exauriculate, median leaves with unequal auricles. Of our species, most similar to *S. eurynota*.

Selaginella lepidophylla (Hook. & Grev.) Spring —sw U.S. (N. Mex., Tex.), Mex. (Baja C.S., Chih., Coah., N.L., Tam., Zac., S.L.P., Nay., Jal., Qro., Cma., Mich., Méx., Mlos., Pue., Oax.), Salv. Of our species, most similar to tufted forms of *S. pallescens*, differing by the lateral leaves turning reddish with age (vs. pale brown or stramineous); median leaves entire, obtuse (vs. ciliate, acute or aristate).

Selaginella marginata (Humb. & Bonpl.) Spring —Western and s Mex. (Sin., Dgo., Nay., Ver., Gro.), S.A. (to Urug. and n Arg.). Differs from other articulate species by the median leaves broadly white-margined; prostrate.

Selaginella stenophylla A. Braun —Southern Mex. (S.L.P., Hgo., Ver., Oax.), Guat. Of our species, most similar to *S. martensii*, differing in having arista of median leaves less than half as long as leaves, median leaves denticulate, and sporophylls dimorphous. Some low-elevation specimens of *S. martensii* may also have short arista and denticulate median leaves.

Selaginella tarapotensis Baker —Southern Mex. (Ver., Oax.), Guat., Pan., S.A. (to Bol.). Stems prostrate, rooting throughout; median leaves denticulate, with arista nearly as long as lamina.

Selaginella umbrosa Lemaire ex Hieron. —Mex. (Yuc.), Bel., Guat., Hond., C.R., Pan., Col. Of our species most similar to *S. hoffmannii*, but the stems bright red (vs. pinkish); leaves of main stem uniform, directed upwards.

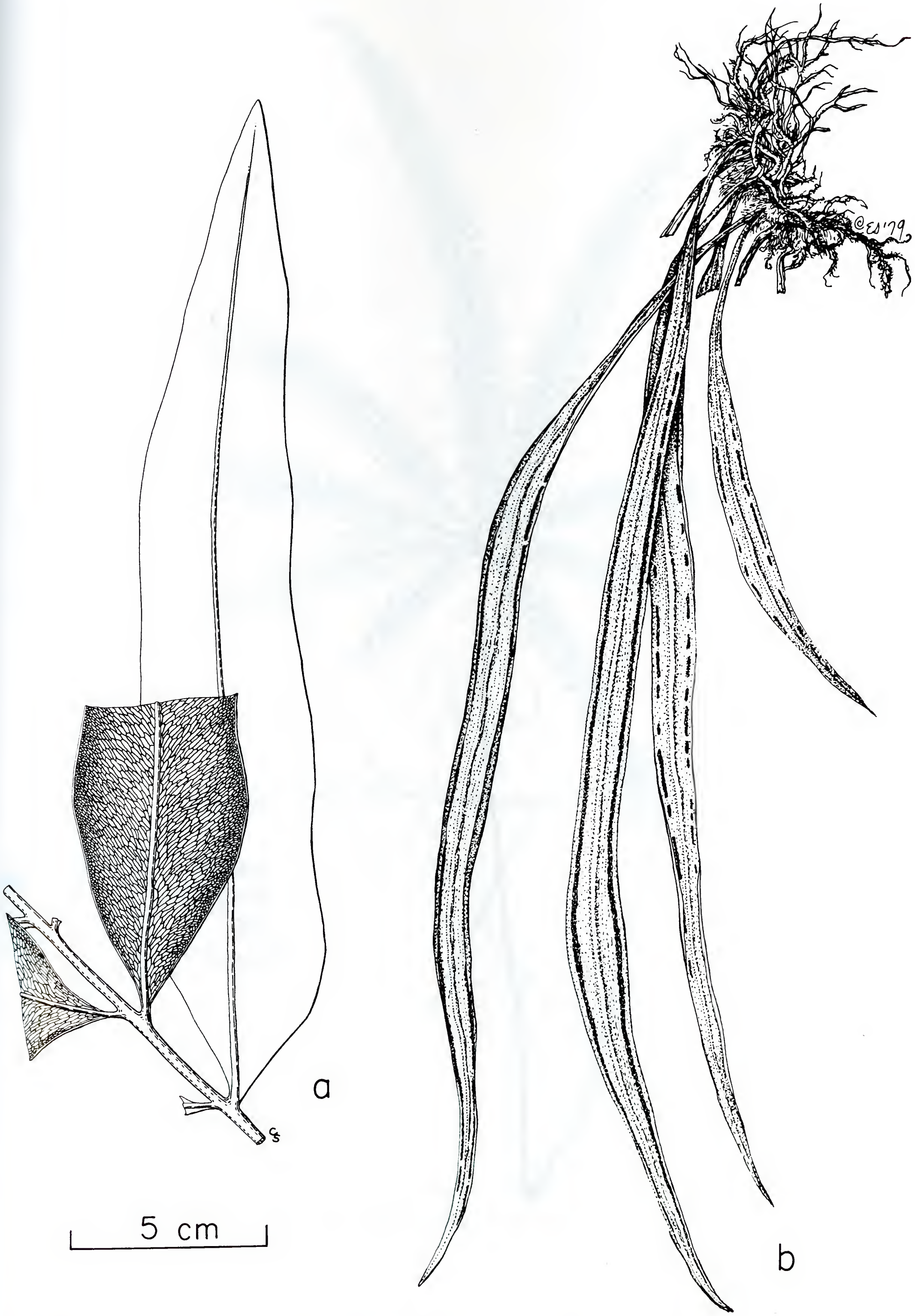

FIGURE 2. *Acrostichum danaeifolium* Langsd. & Fisch., *33175*: a, pinnae, showing venation. —*Ananthacorus angustifolius* (Swartz) Maxon & Underw., *21917, 33156*: b, habit.

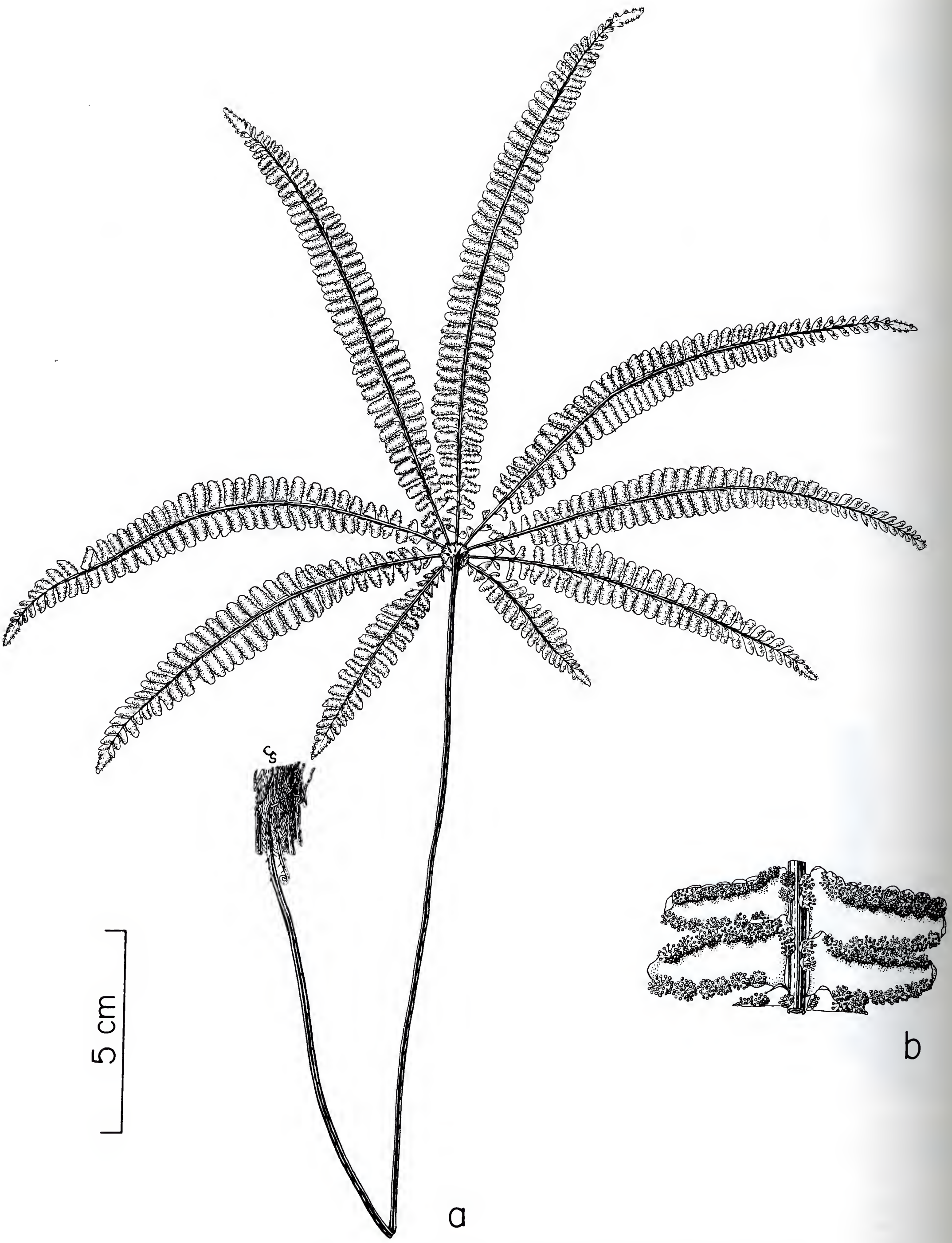

Figure 3. *Adiantopsis radiata* (L.) Fée, *21884*: a, habit; b, portion of pinna, showing sori.

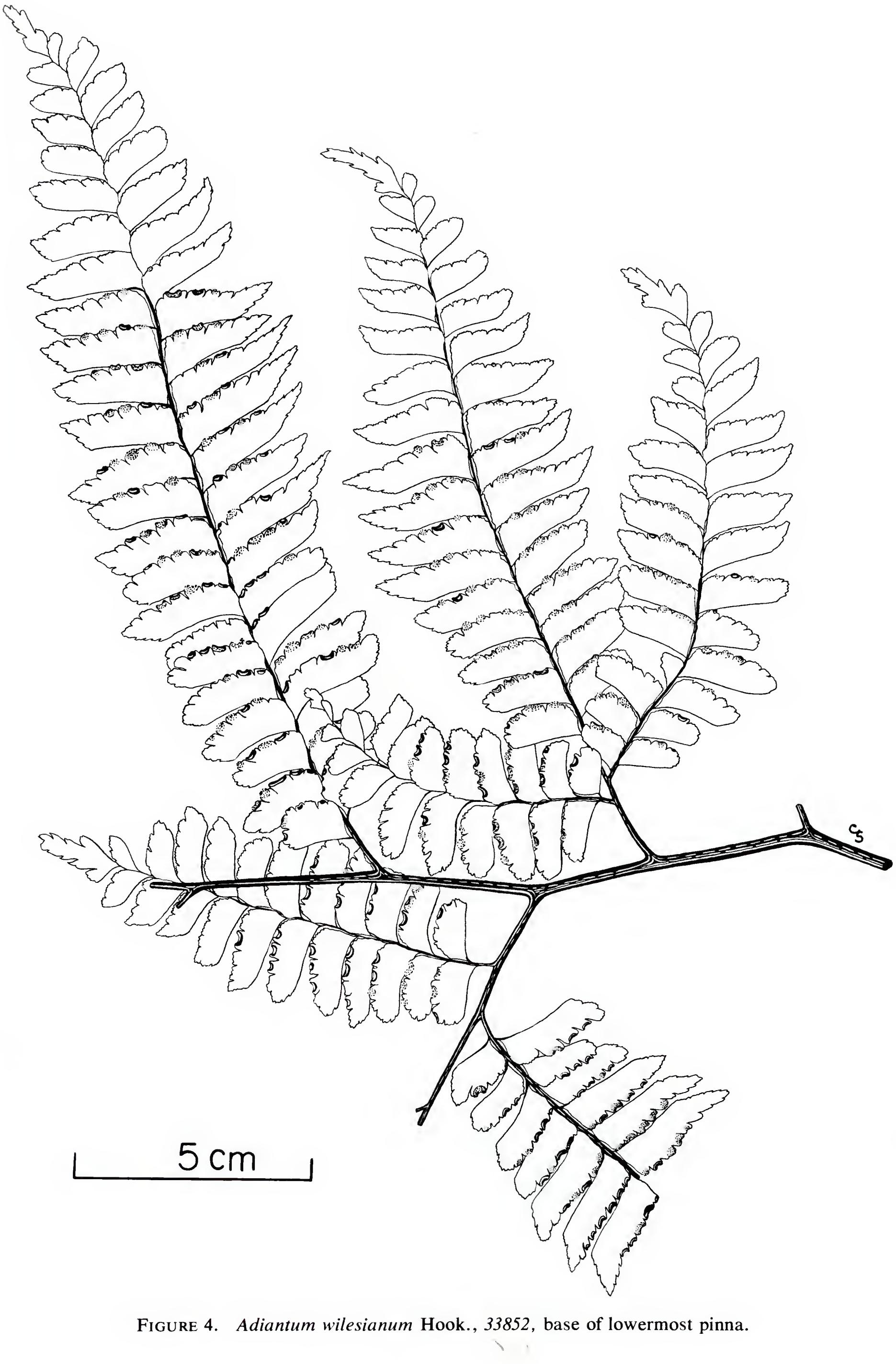

FIGURE 4. *Adiantum wilesianum* Hook., *33852*, base of lowermost pinna.

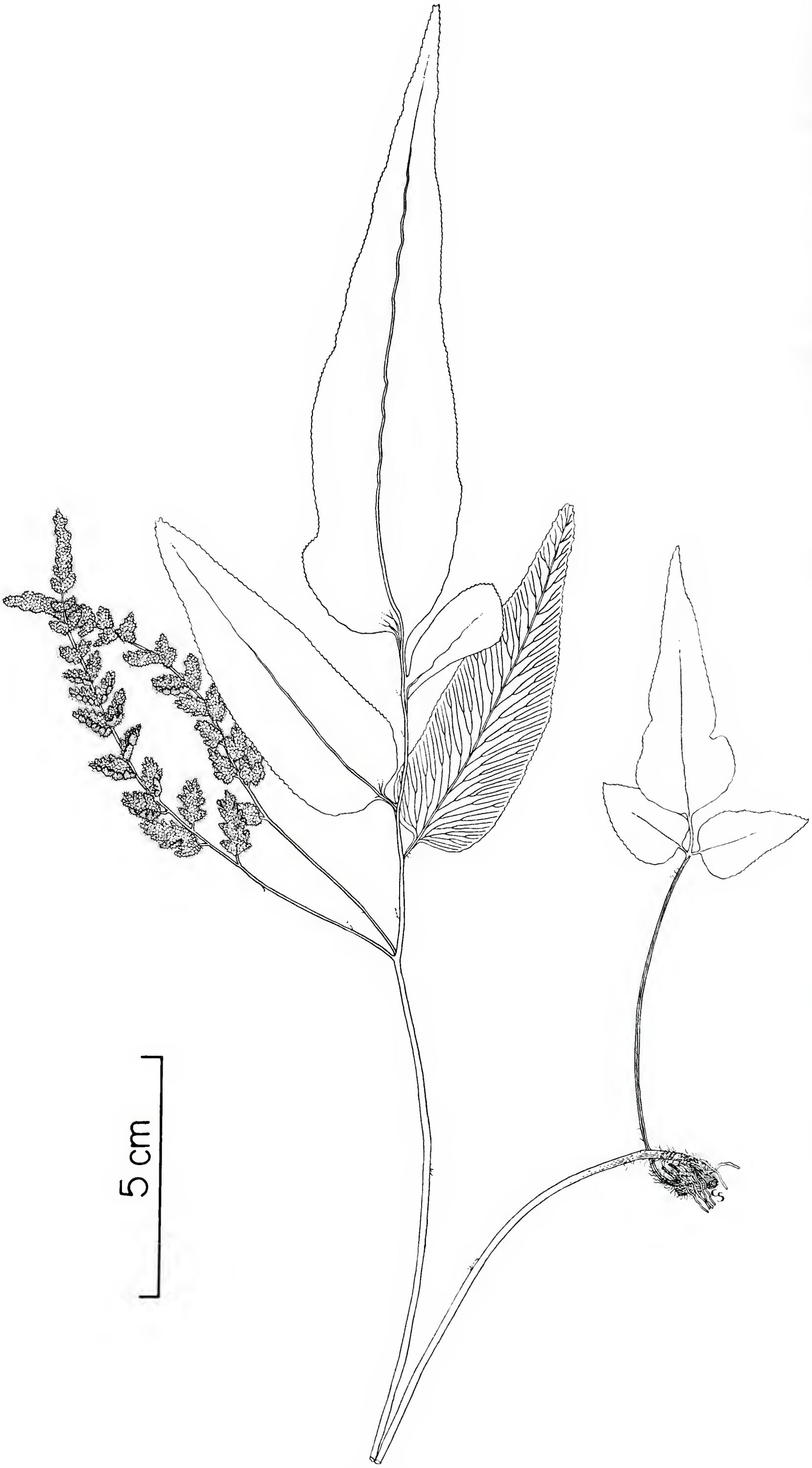

FIGURE 5. *Anemia speciosa* Presl, *32950,* habit.

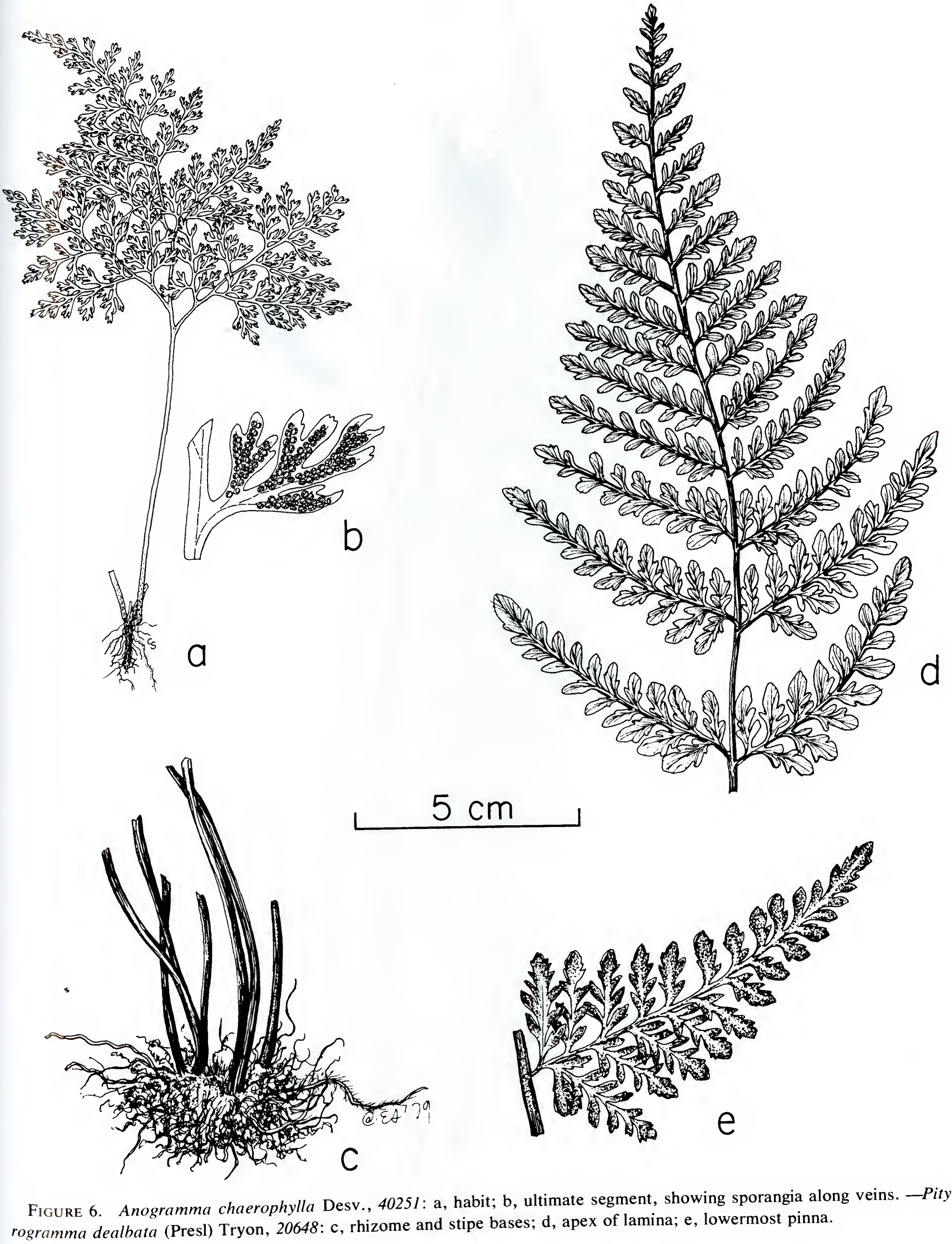

Figure 6. *Anogramma chaerophylla* Desv., *40251*: a, habit; b, ultimate segment, showing sporangia along veins. —*Pityrogramma dealbata* (Presl) Tryon, *20648*: c, rhizome and stipe bases; d, apex of lamina; e, lowermost pinna.

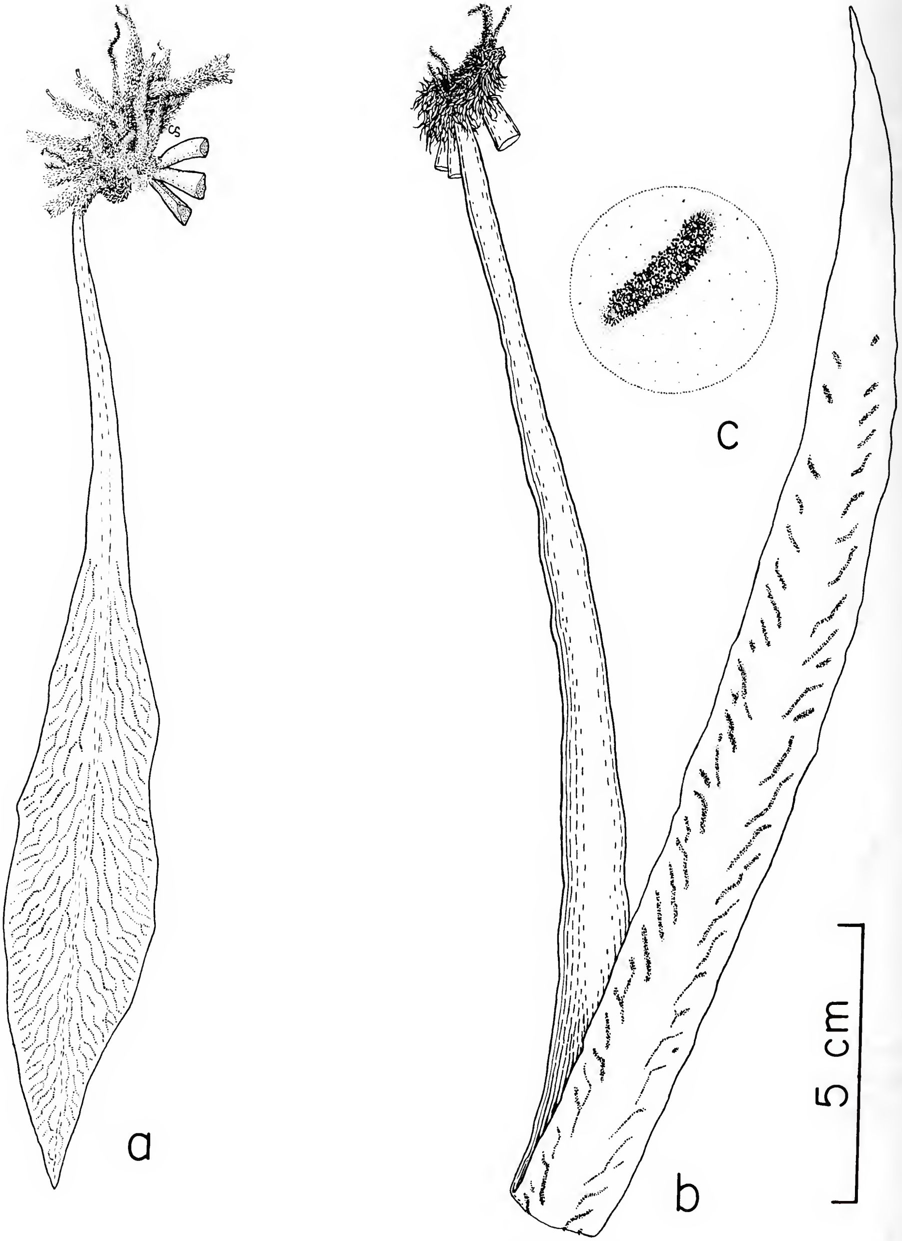

FIGURE 7. *Antrophyum cajenense* (Desv.) Spreng., *34060*: a, habit. —*Antrophyum ensiforme* Hook., *25372*: b, habit; c, sorus.

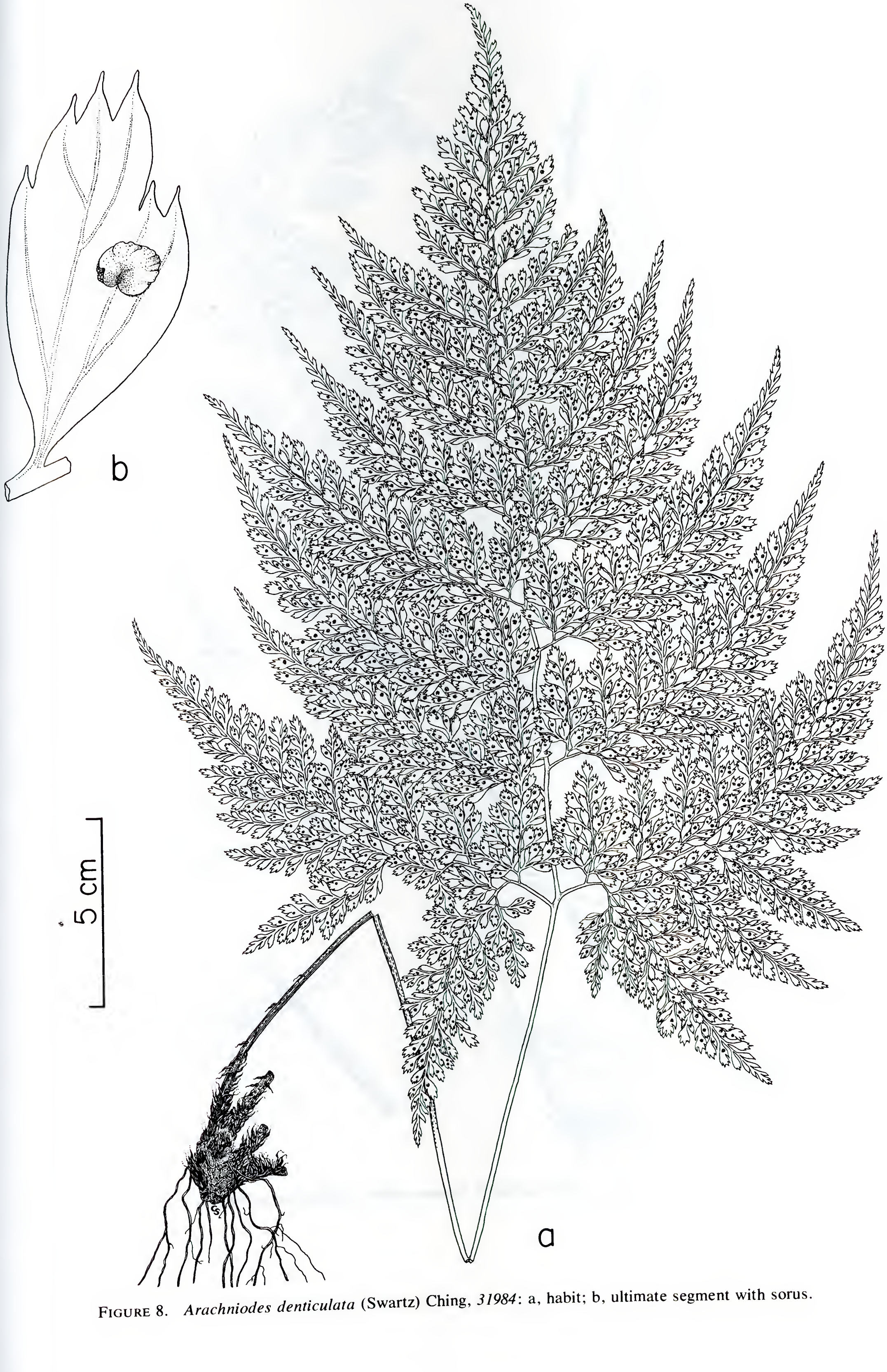

FIGURE 8. *Arachniodes denticulata* (Swartz) Ching, *31984*: a, habit; b, ultimate segment with sorus.

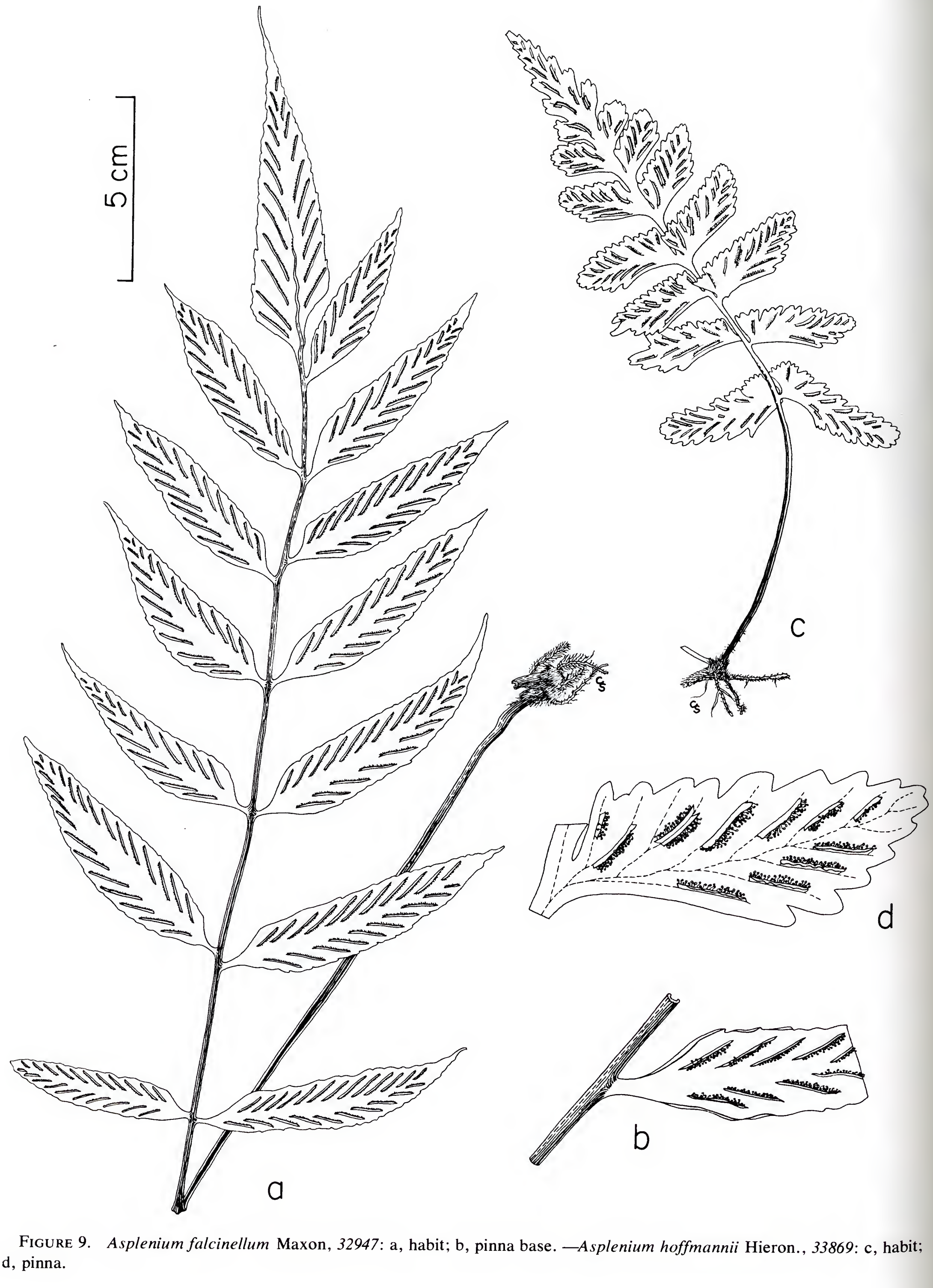

FIGURE 9. *Asplenium falcinellum* Maxon, *32947*: a, habit; b, pinna base. —*Asplenium hoffmannii* Hieron., *33869*: c, habit; d, pinna.

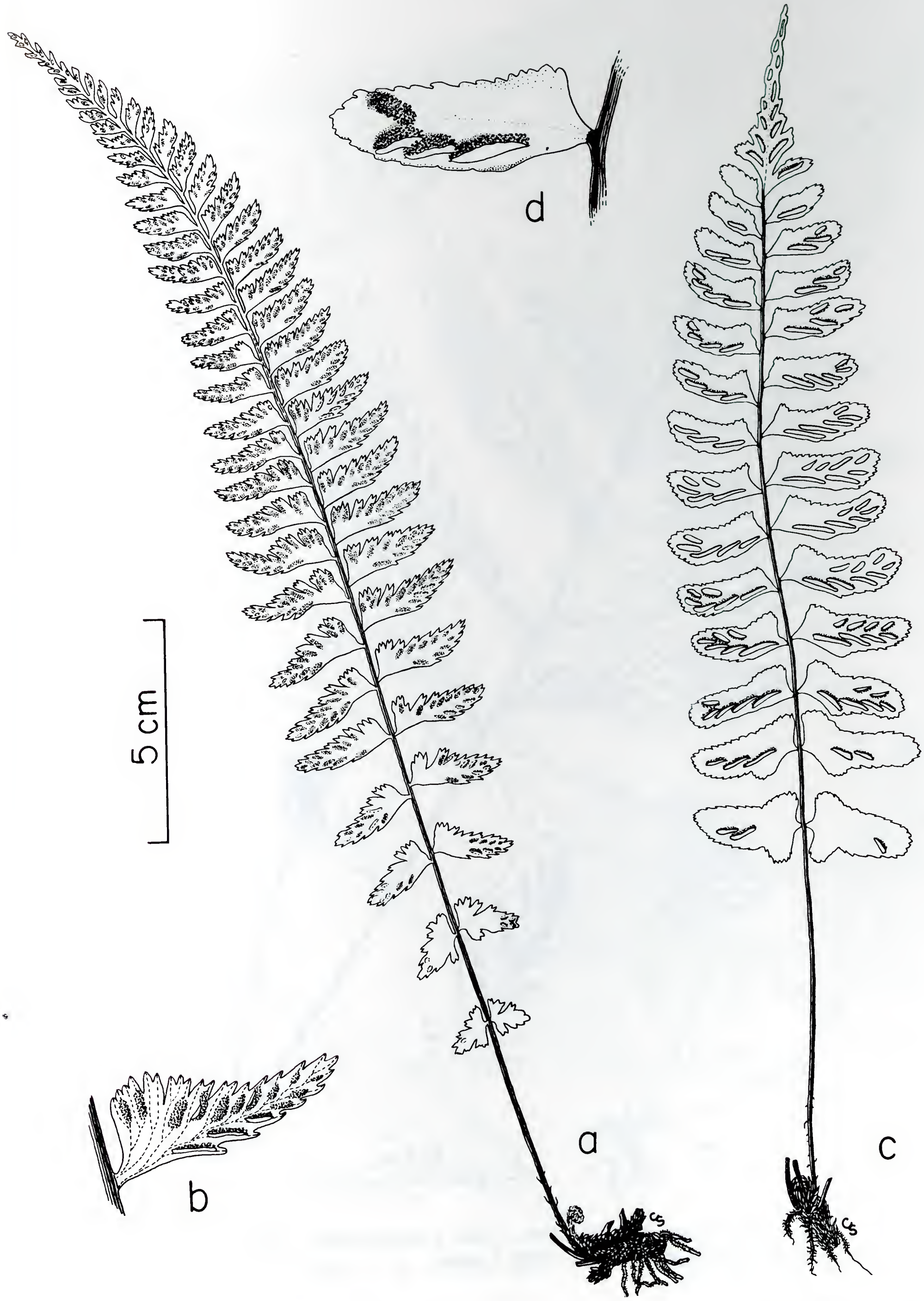

FIGURE 10. *Asplenium miradorense* Liebm., *24987*: a, habit; b, pinna. —*Asplenium lamprocaulon* Fée, *31441*: c, habit; d, pinna.

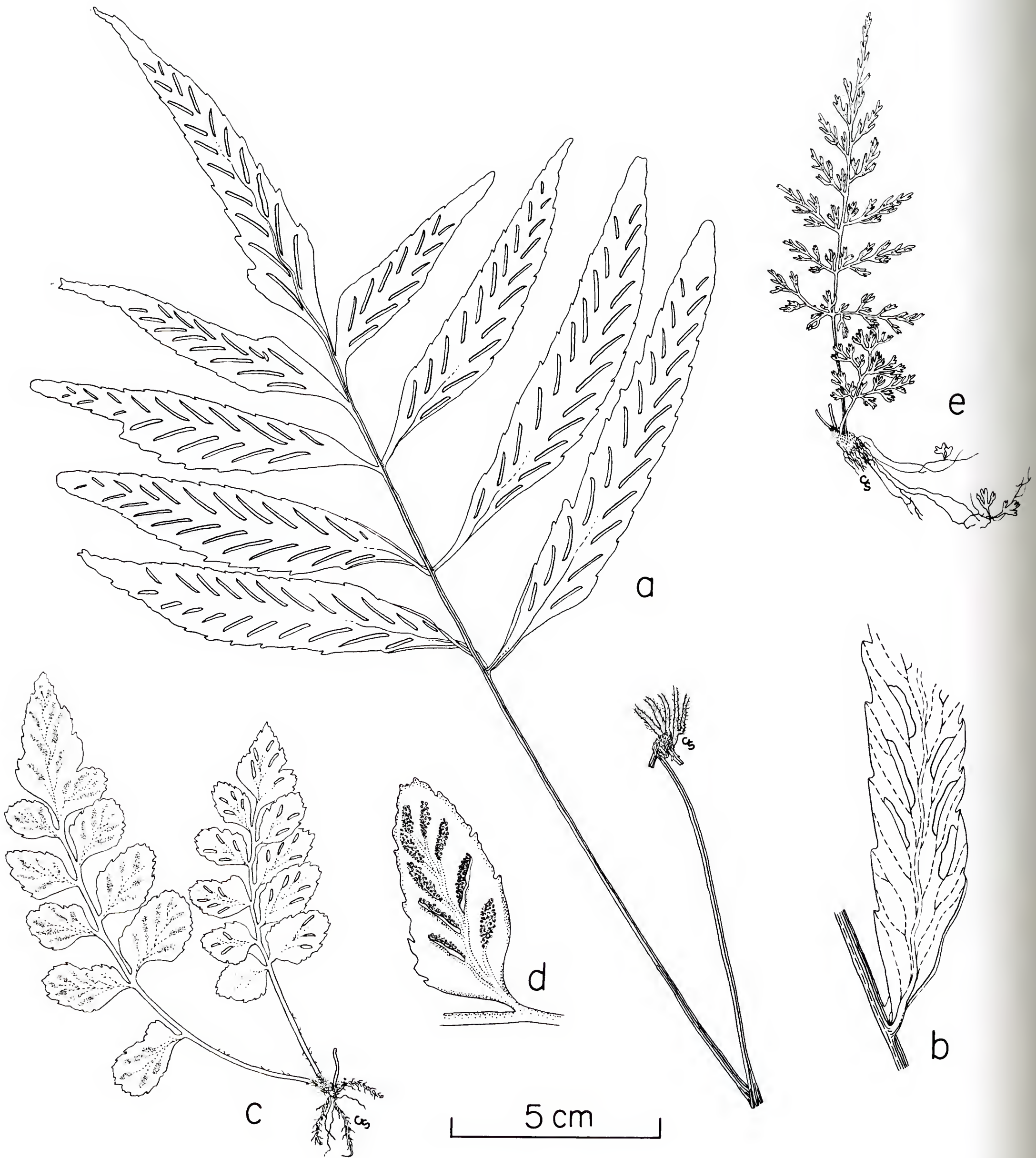

FIGURE 11. *Asplenium tuerckheimii* Maxon, *22299*: a, habit; b, base of pinna. —*Asplenium virillae* Christ, *21798*: c, habit; d, pinna. —*Asplenium fournieri* Kuhn ex Fourn., *37593*: e, habit.

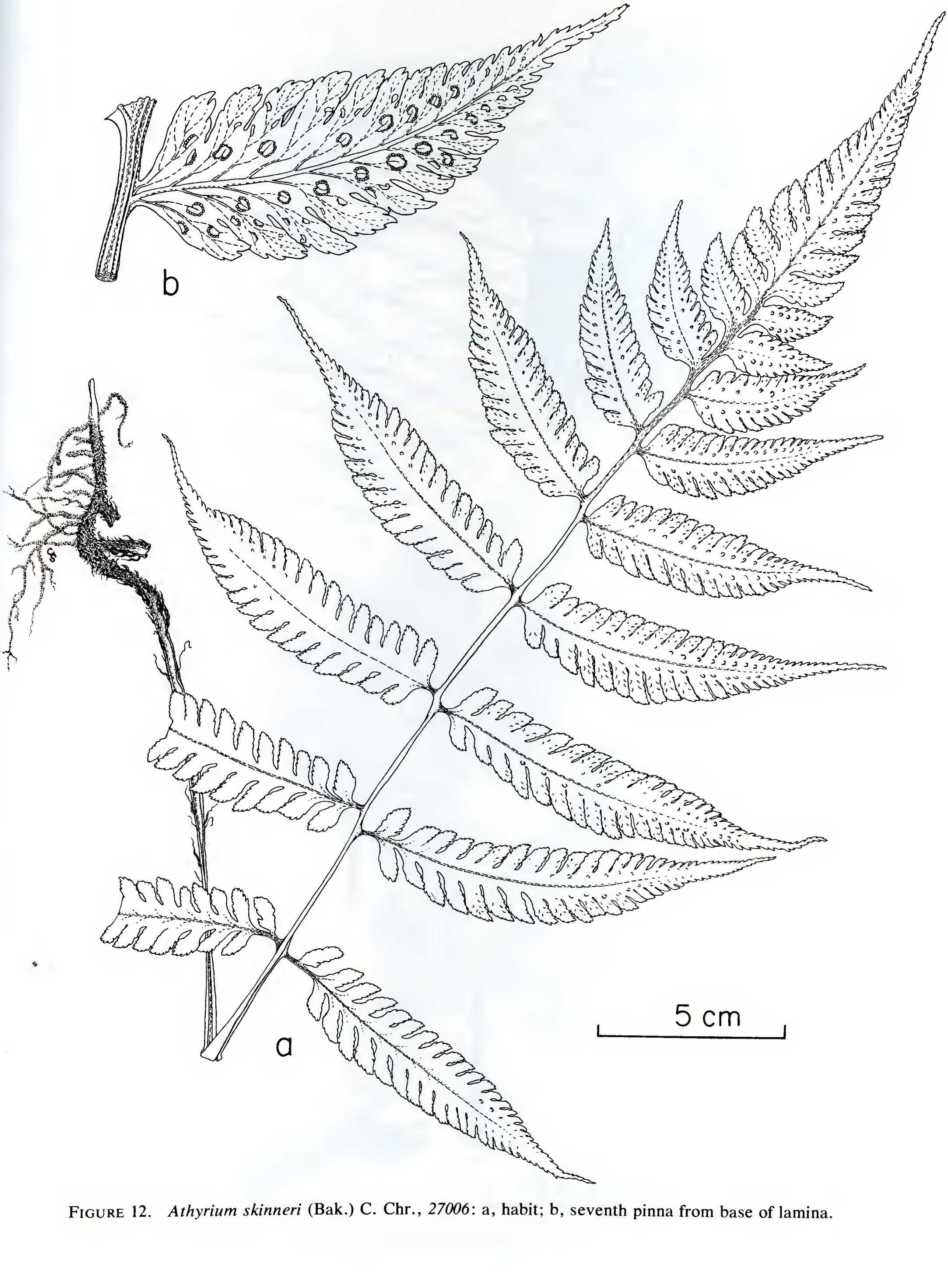

FIGURE 12. *Athyrium skinneri* (Bak.) C. Chr., *27006*: a, habit; b, seventh pinna from base of lamina.

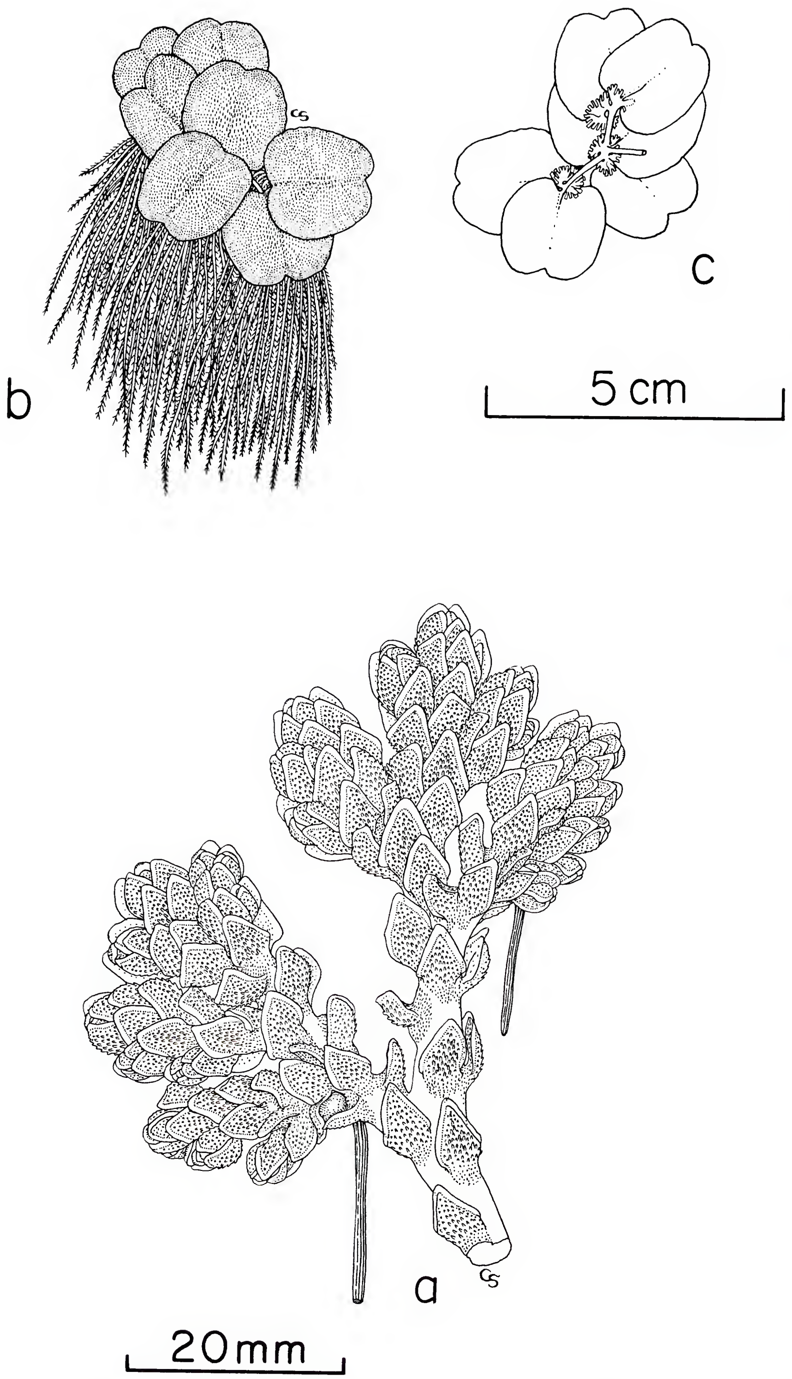

FIGURE 13. *Azolla caroliniana* Willd., *38372*: a, habit. —*Salvinia auriculata* Aubl., *34932*: b, habit; c, underside of lamina.

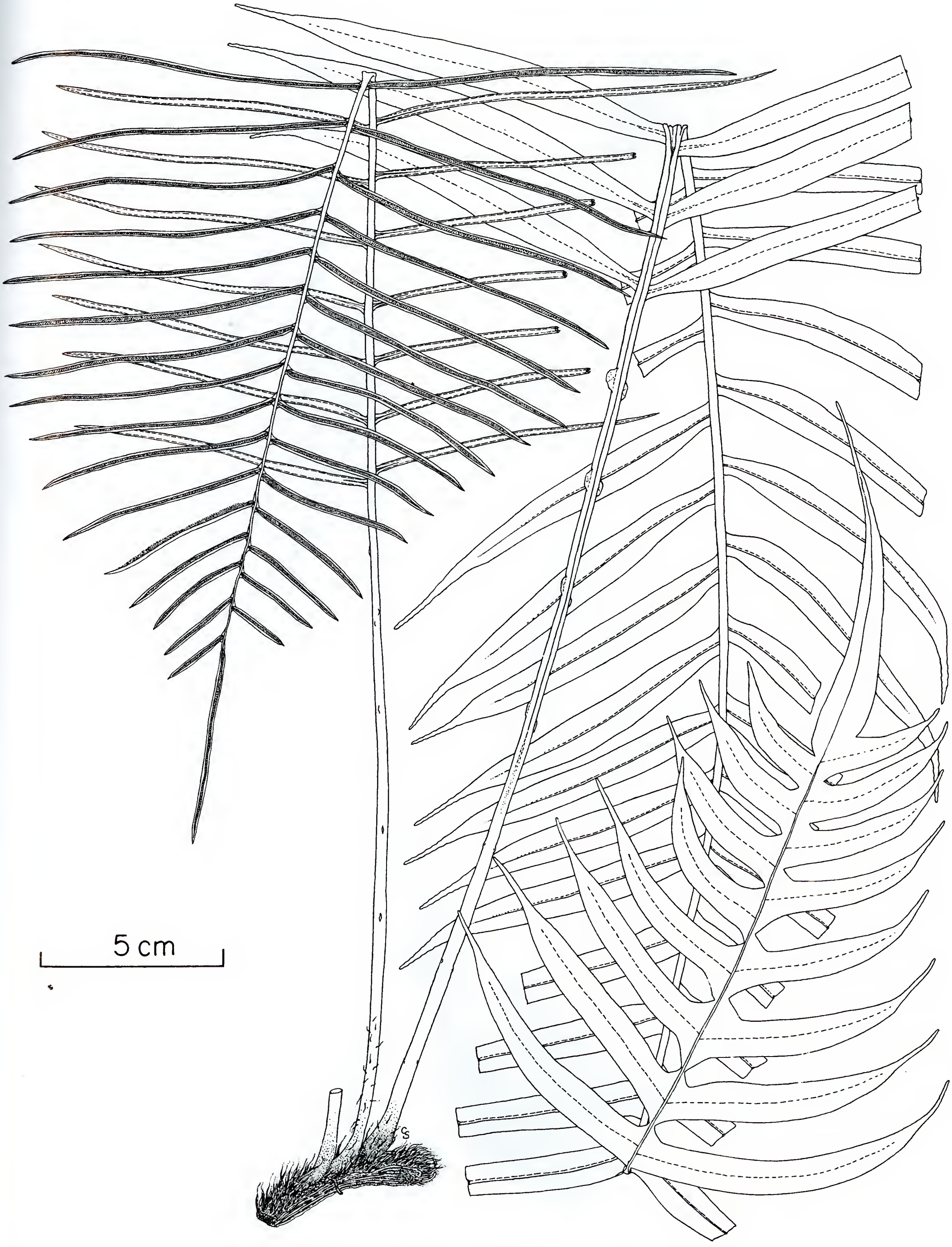

FIGURE 14. *Blechnum ensiforme* (Liebm.) C. Chr., *31708*: habit.

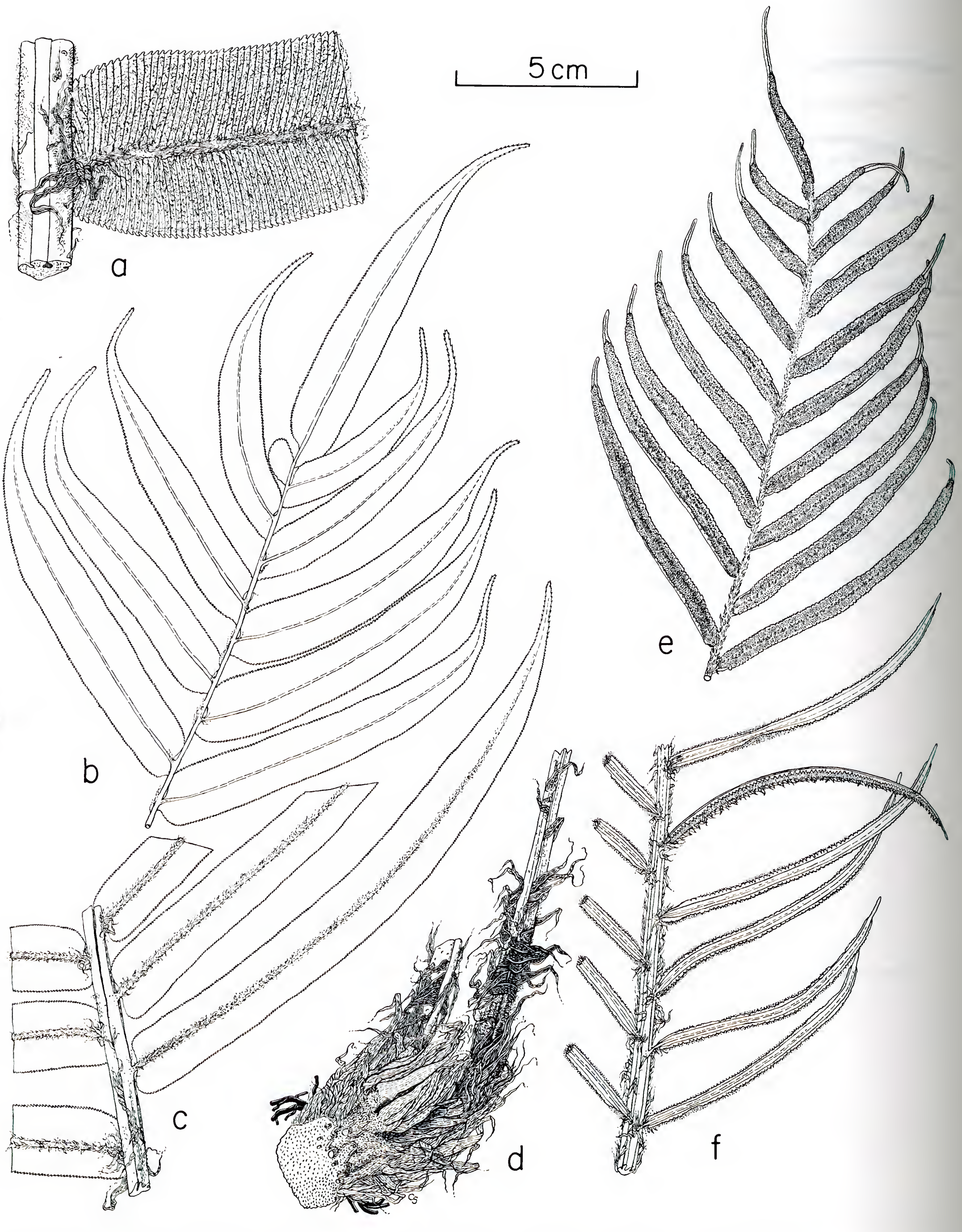

FIGURE 15. *Blechnum falciforme* (Liebm.) C. Chr., *22807*: a, base of sterile pinna; b, apex of sterile frond; c, basal pinnae of sterile frond; d, rhizome and stipe base; e, apex of fertile frond; f, basal pinnae of fertile frond.

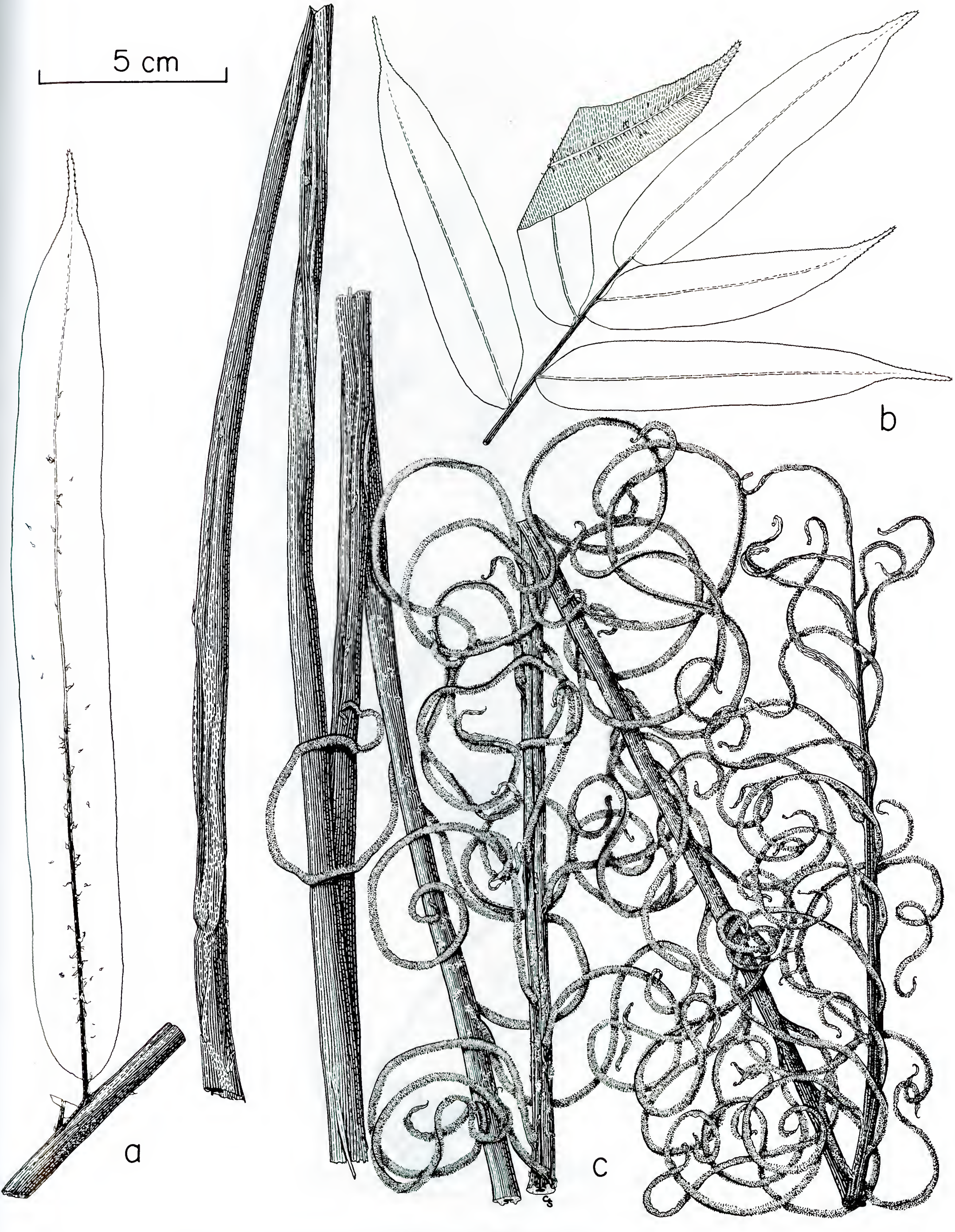

FIGURE 16. *Blechnum varians* (Fourn.) C. Chr., *25131*: a, sterile pinna; b, apex of sterile frond; c, fertile frond.

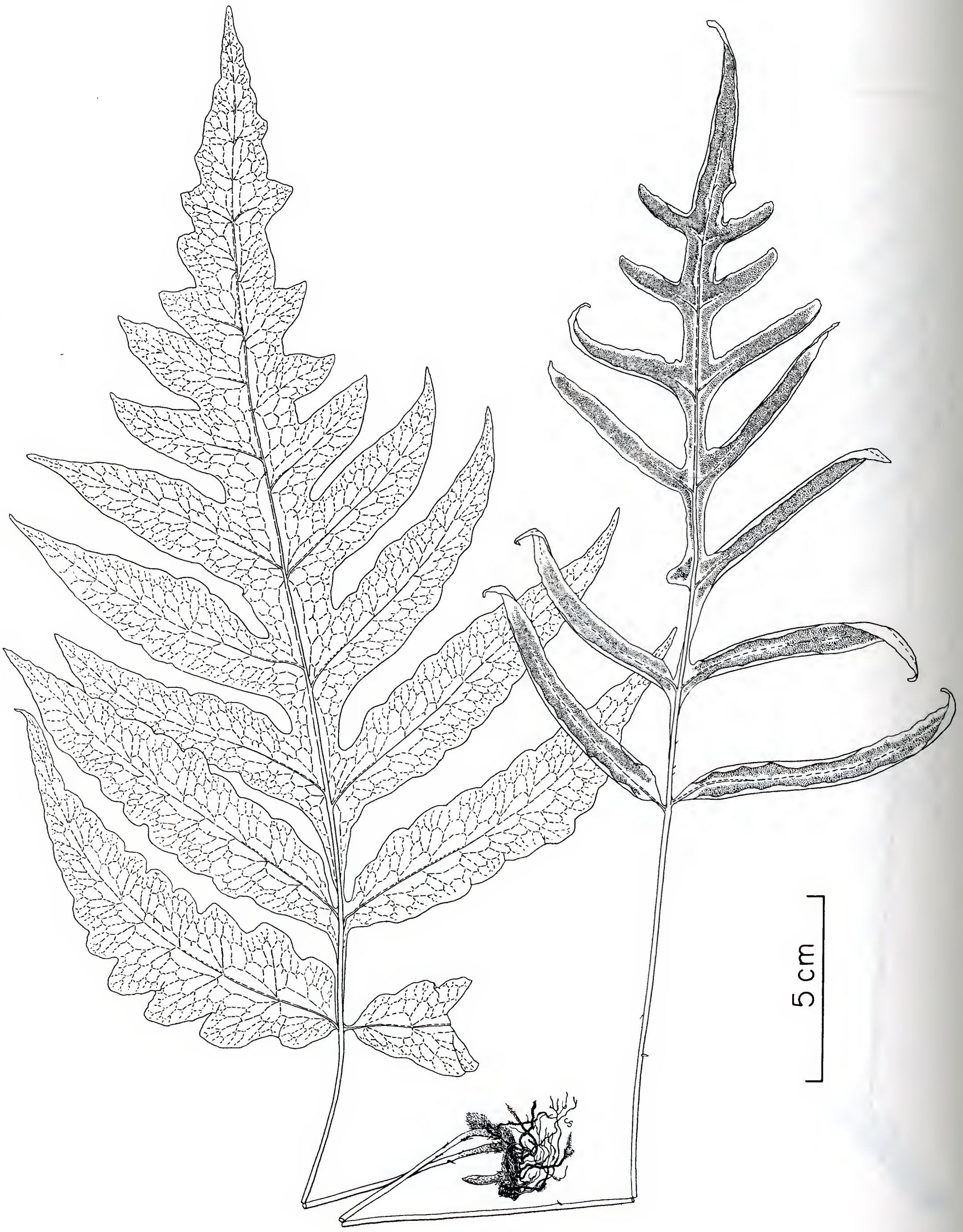

FIGURE 17. *Bolbitis aliena* (Swartz) Alston, *21621*, habit.

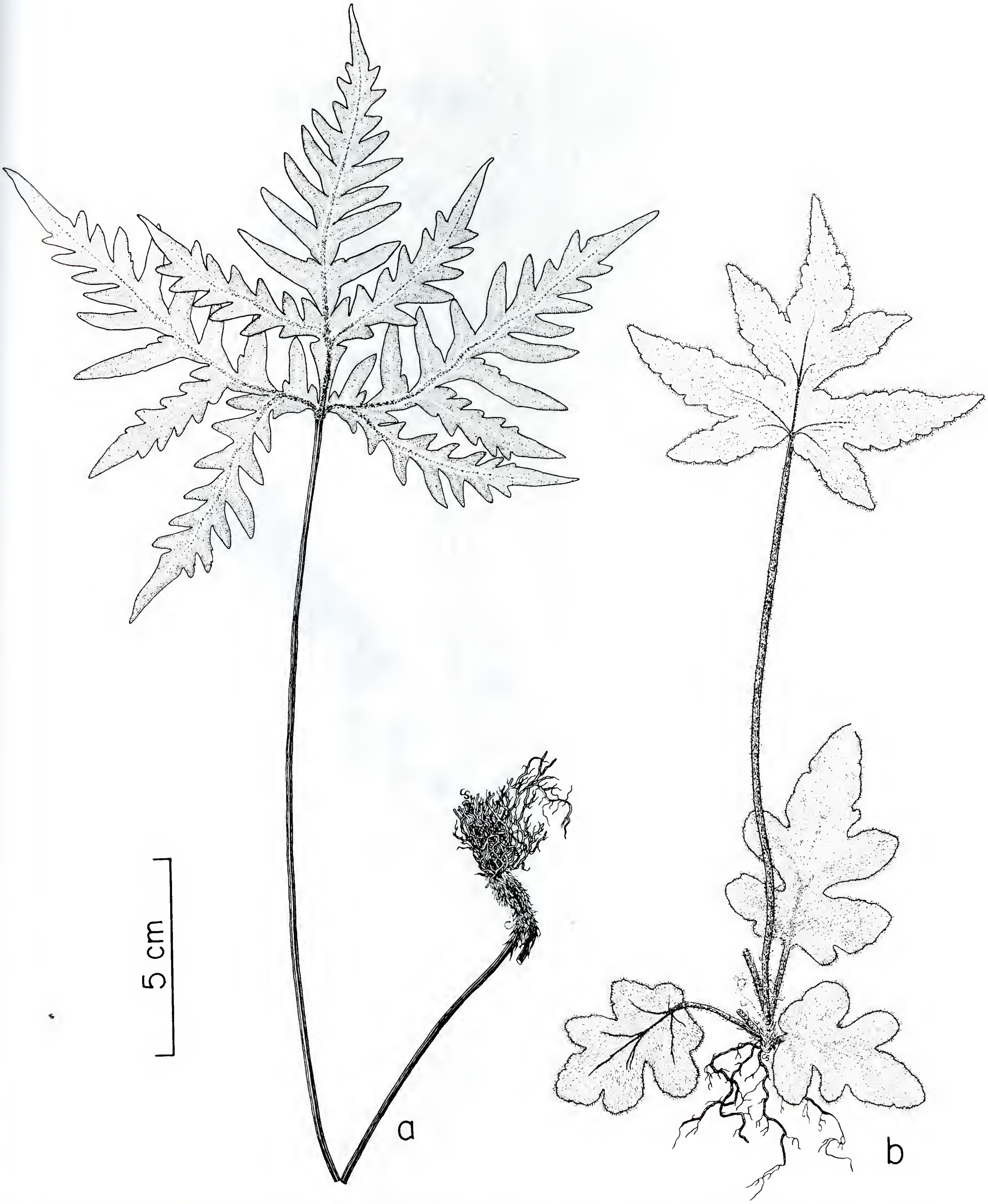

FIGURE 18. *Bommeria pedata* (Swartz) Fourn., *Münch 161* (DS): a, habit. —*Hemionitis pinnatifida* Baker, *21907, 40166*: b, habit.

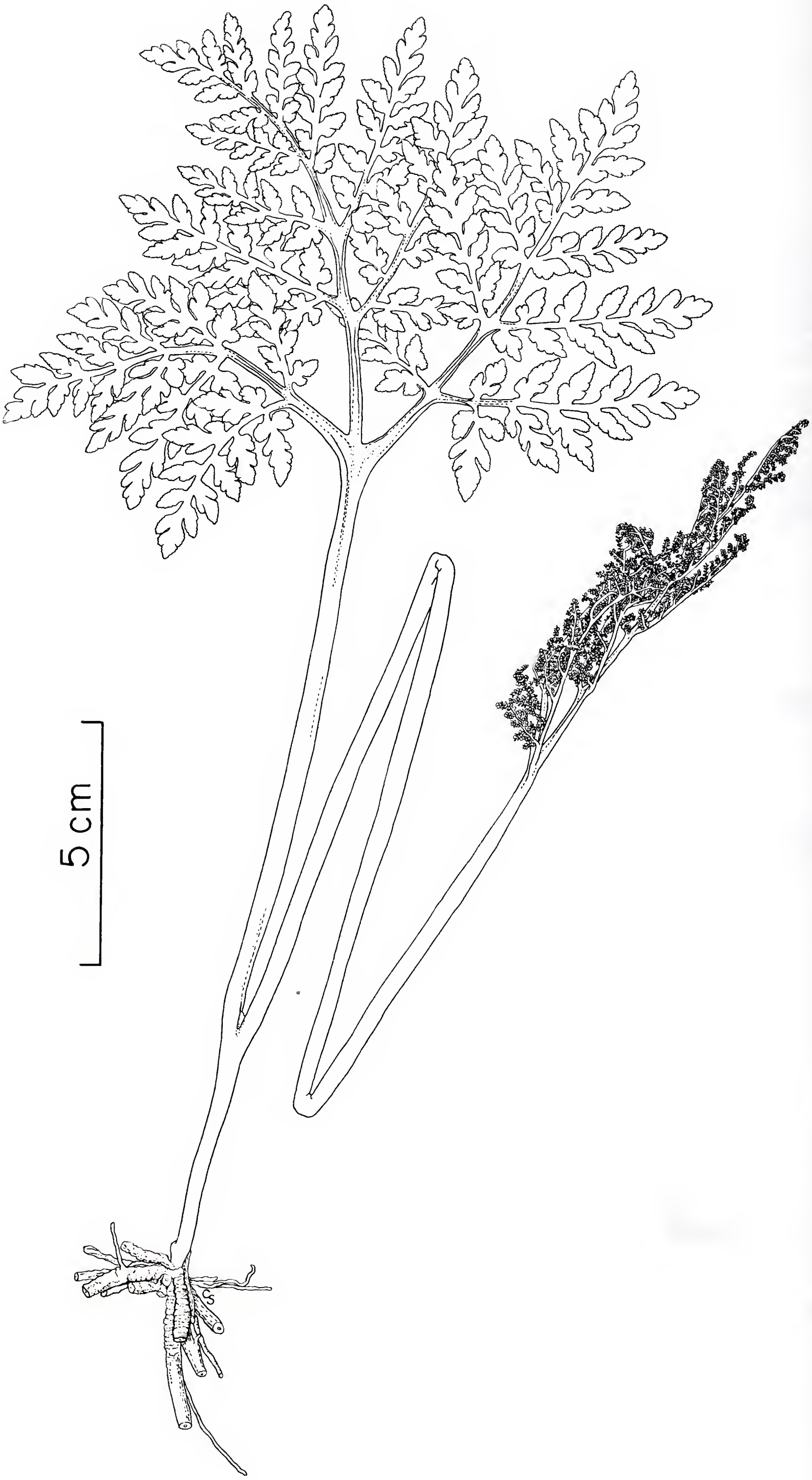

FIGURE 19. *Botrychium schaffneri* Underw., *Thorne & Lathrop 41124* (DS), habit.

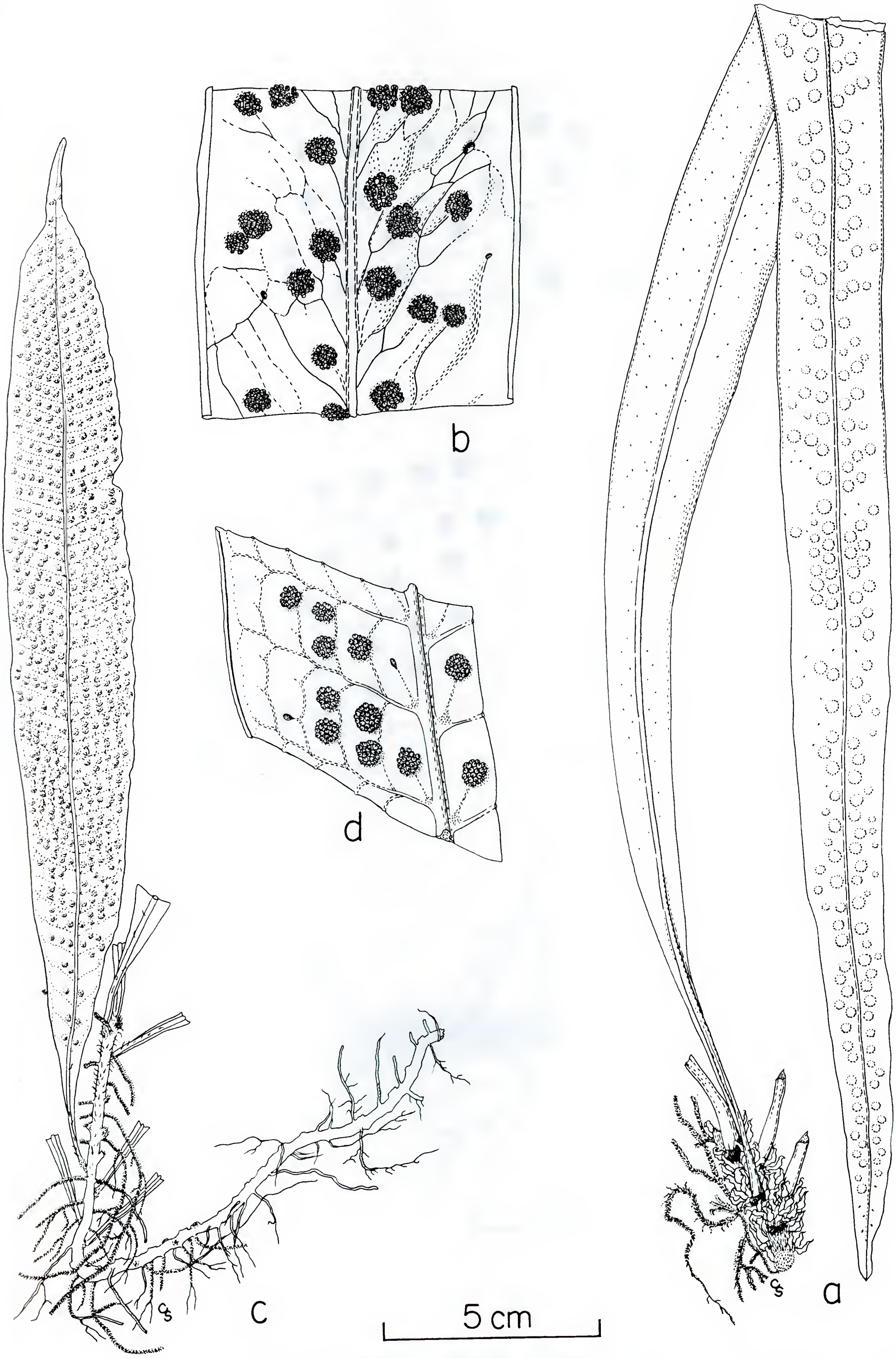

FIGURE 20. *Campyloneurum amphostenon* (Kunze ex Klotzsch) Fée, *22021*: a, habit; b, venation and sori. —*Campyloneurum serpentinum* (Christ) Ching, *33935*: c, habit; d, venation and sori.

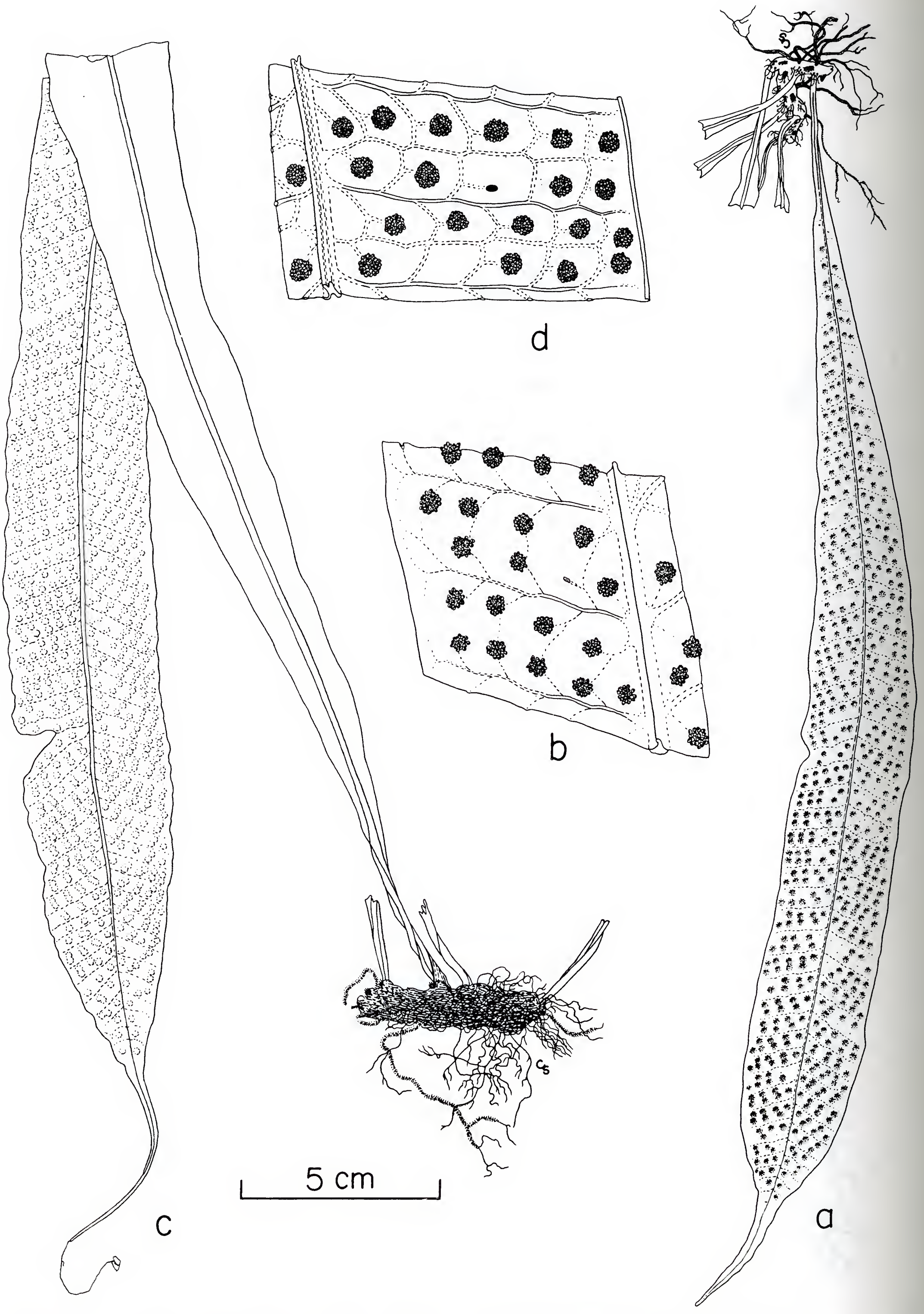

FIGURE 21. *Campyloneurum occultum* (Christ) L. D. Gómez, *26527*: a, habit; b, venation and sori. —*Campyloneurum xalapense* Fée, *27433*: c, habit; d, venation and sori.

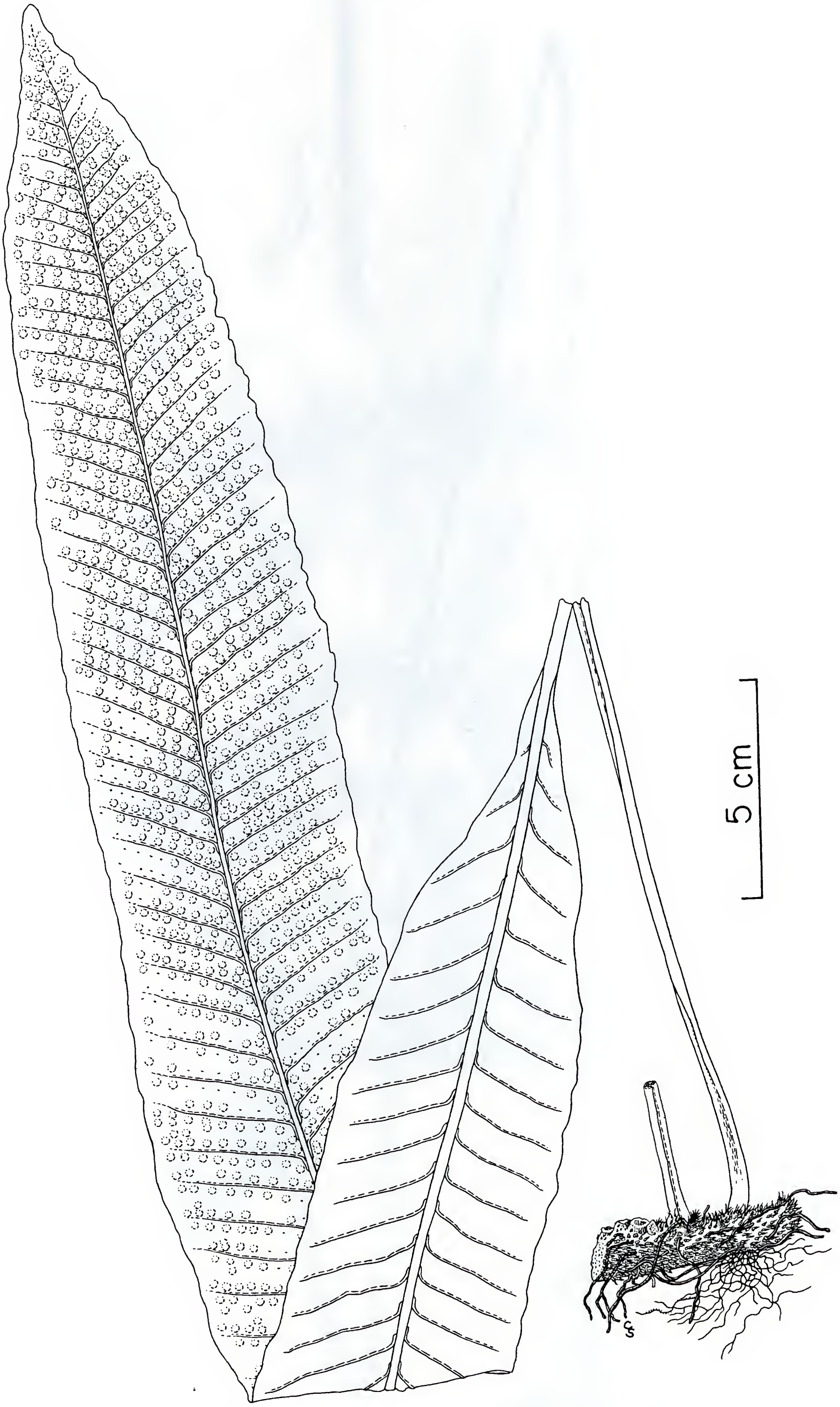

Figure 22. *Campyloneurum tenuipes* Maxon, *34629A*, habit.

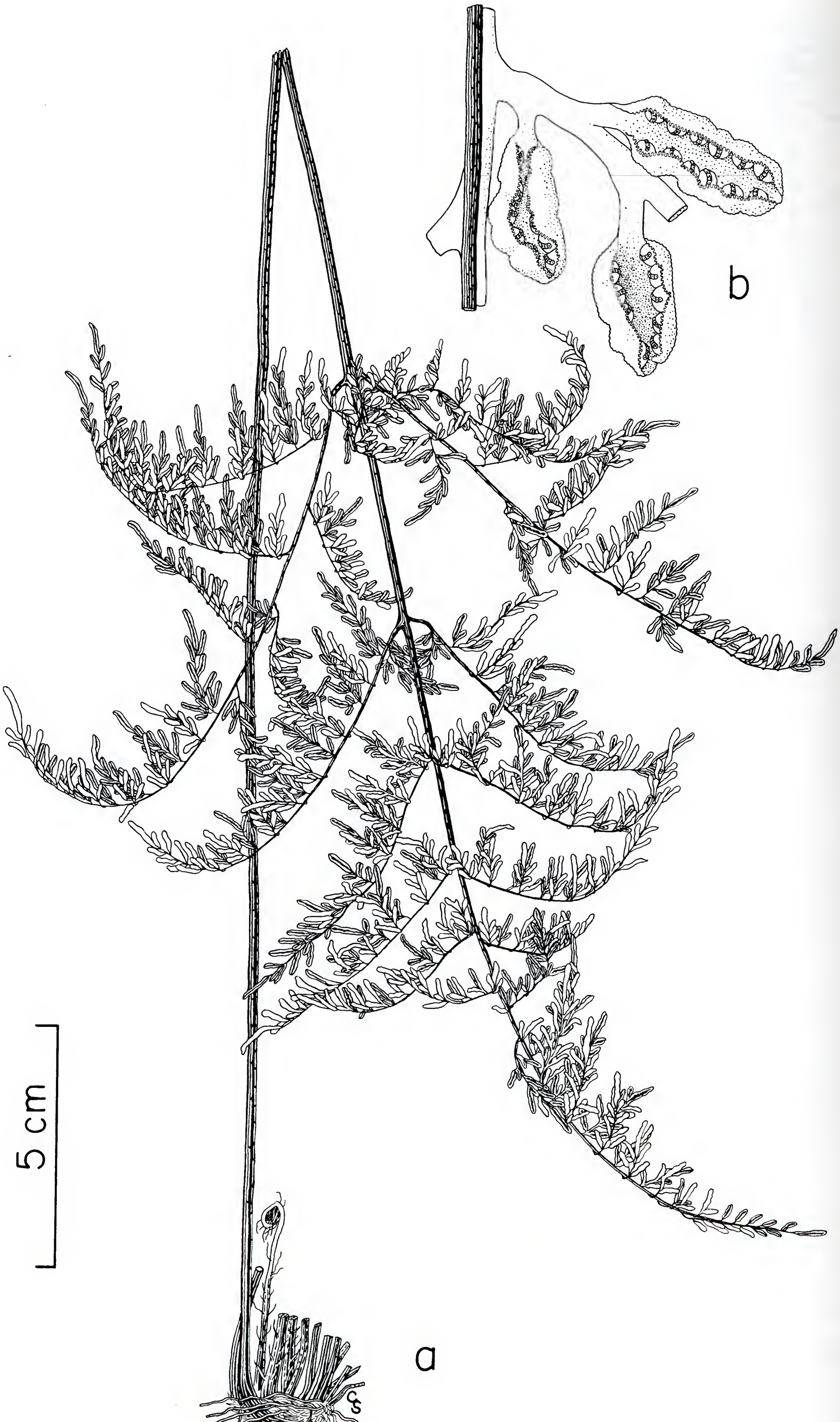

FIGURE 23. *Cheilanthes chaerophylla* (Mart. & Gal.) Kunze, *26942*: a, habit; b, ultimate segments.

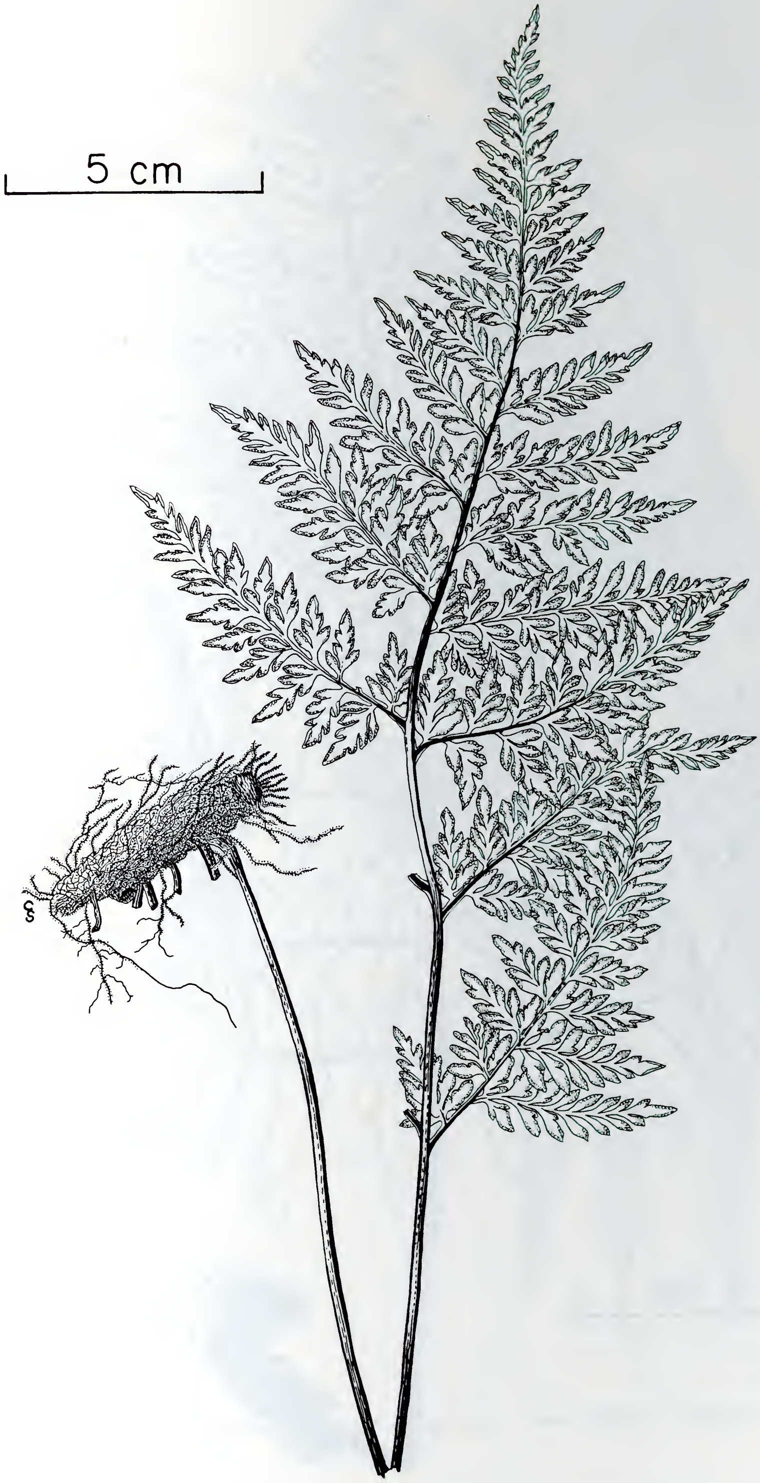

FIGURE 24. *Cheilanthes cuneata* Link, *22683*, habit.

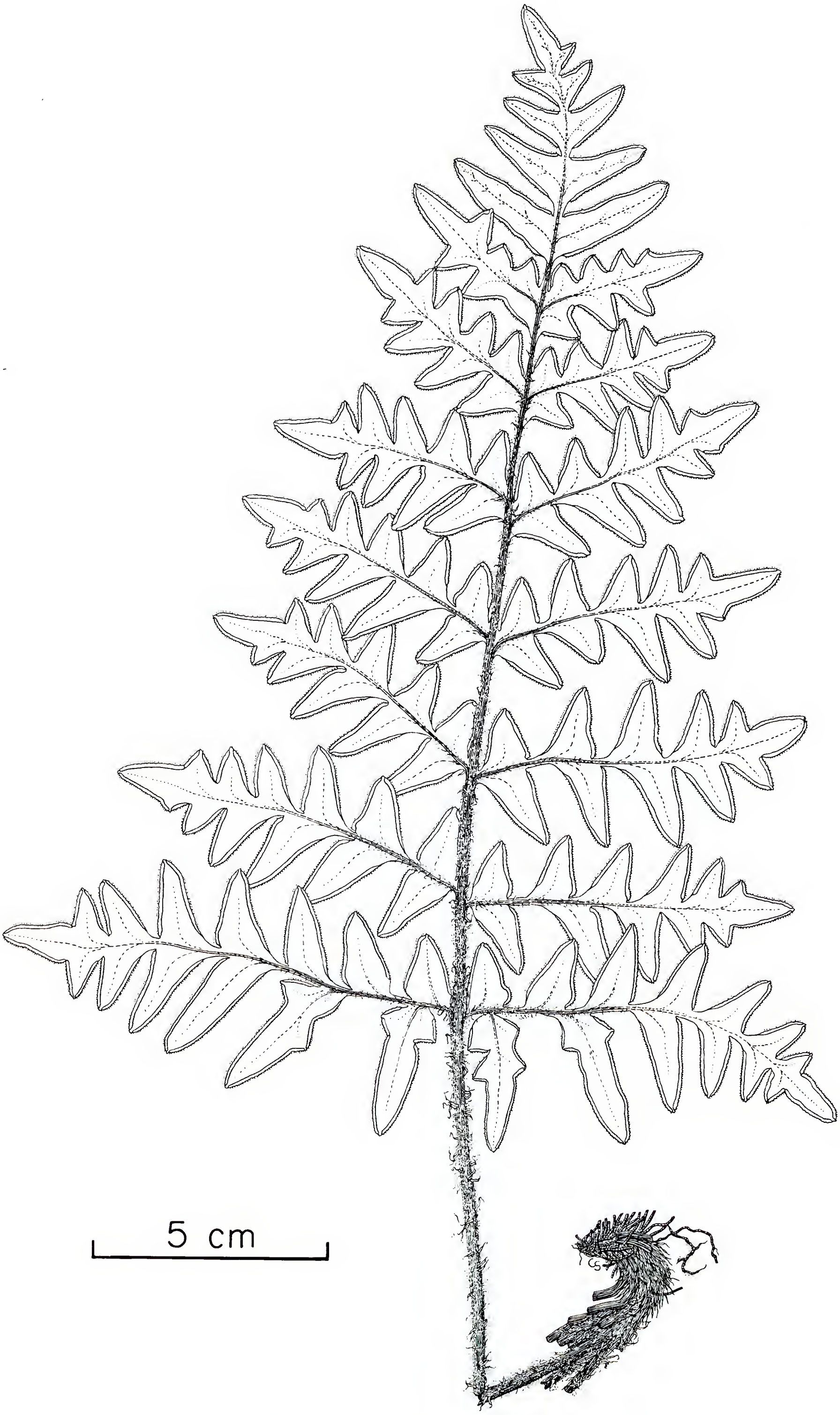

Figure 25. *Cheiloplecton rigidum* (Swartz) Fée, *39640*, habit.

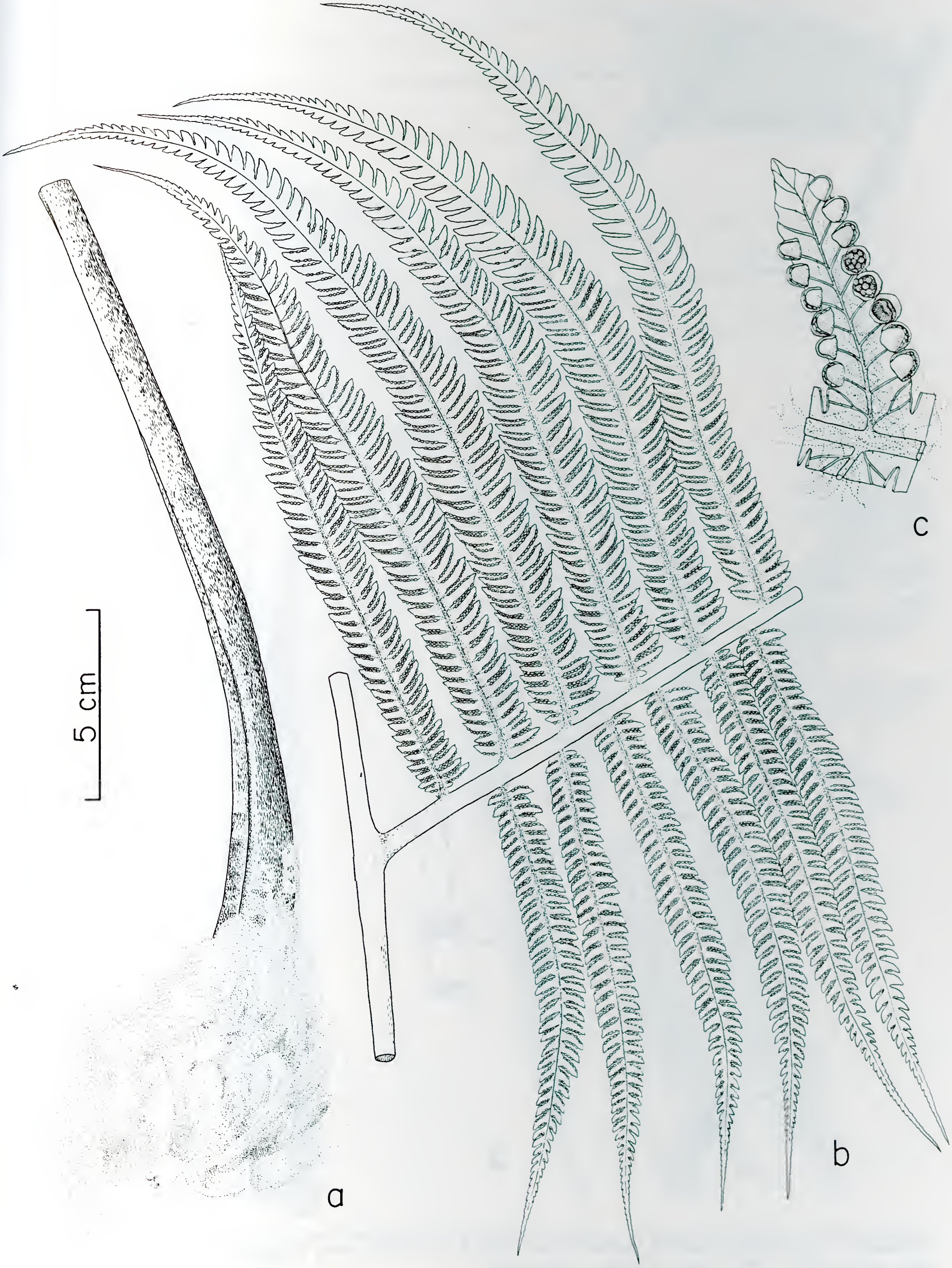

FIGURE 26. *Cibotium regale* Versch. & Lam., *32516*: a, stipe base; b, base of pinna; c, ultimate segments, showing sori.

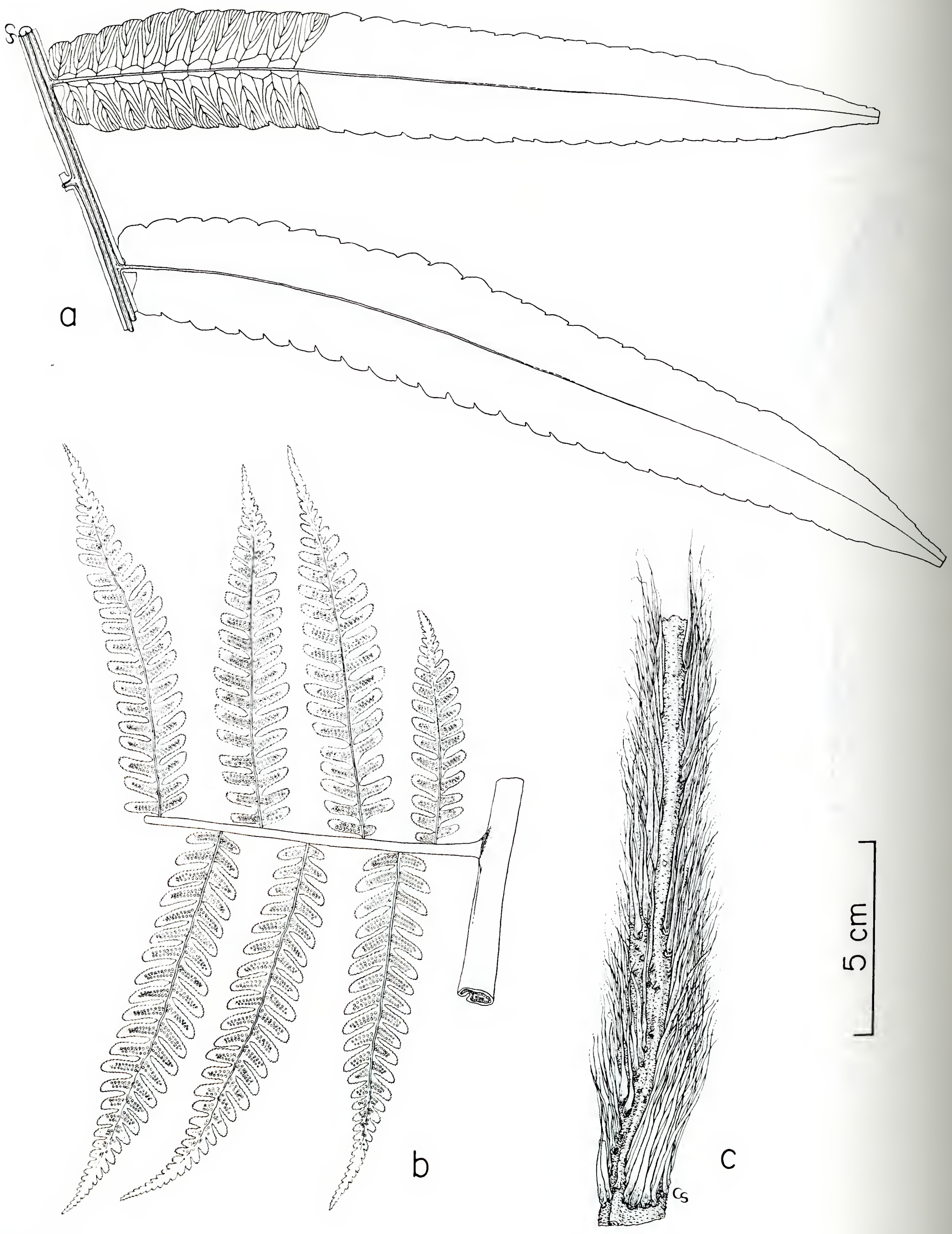

FIGURE 27. *Cnemidaria decurrens* (Liebm.) Tryon, *Münch s.n.* (DS): a, lower pinnae, showing venation. —*Cyathea fulva* (Mart. & Gal.) Fée, *15196*: b, base of pinna; c, stipe base.

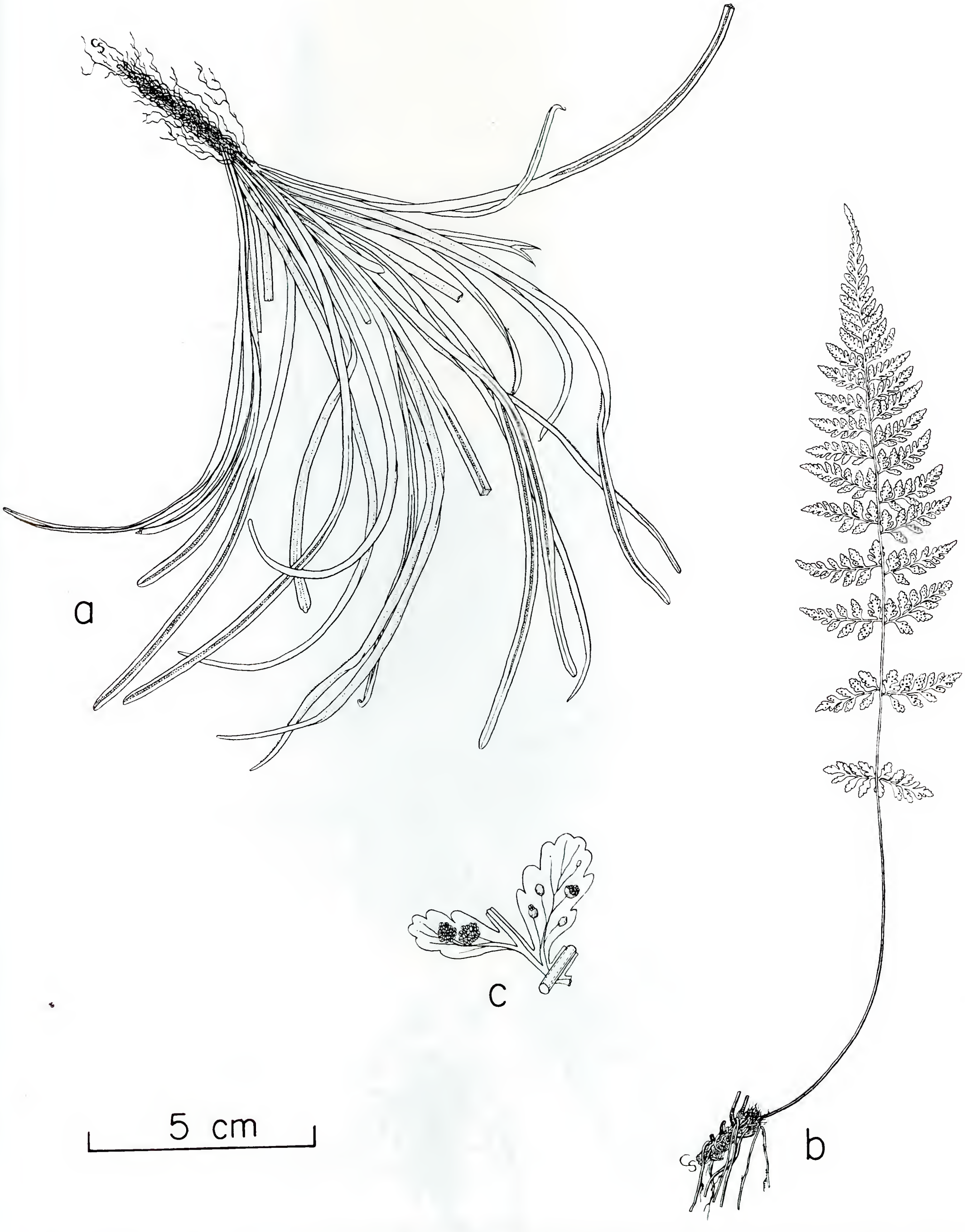

FIGURE 28. *Cochlidium rostratum* (Hook.) Maxon ex C. Chr., *32226*: a, habit. —*Cystopteris fragilis* (L.) Bernh., *23254*: b, habit; c, ultimate segment, showing sori.

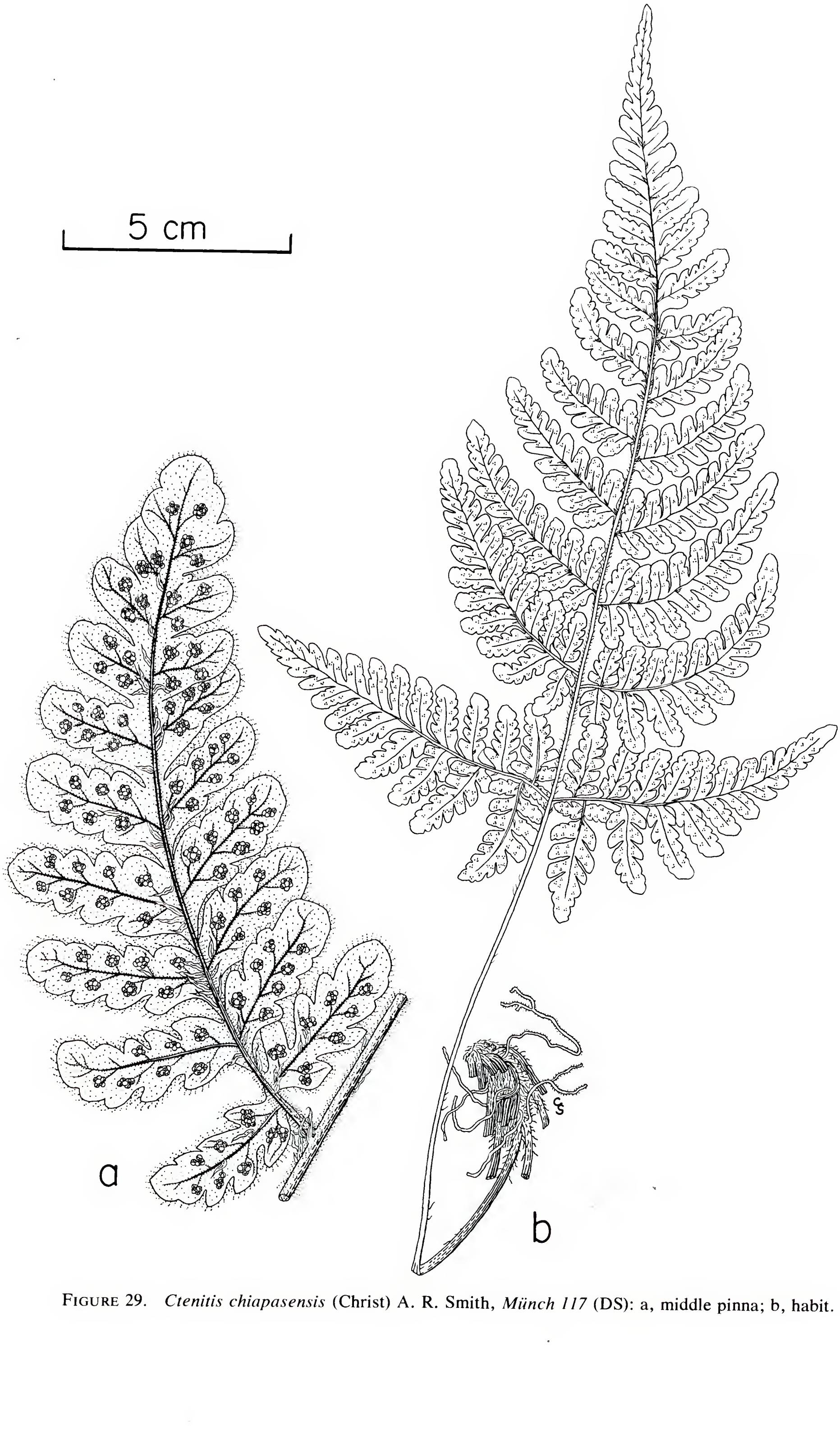

FIGURE 29. *Ctenitis chiapasensis* (Christ) A. R. Smith, *Münch 117* (DS): a, middle pinna; b, habit.

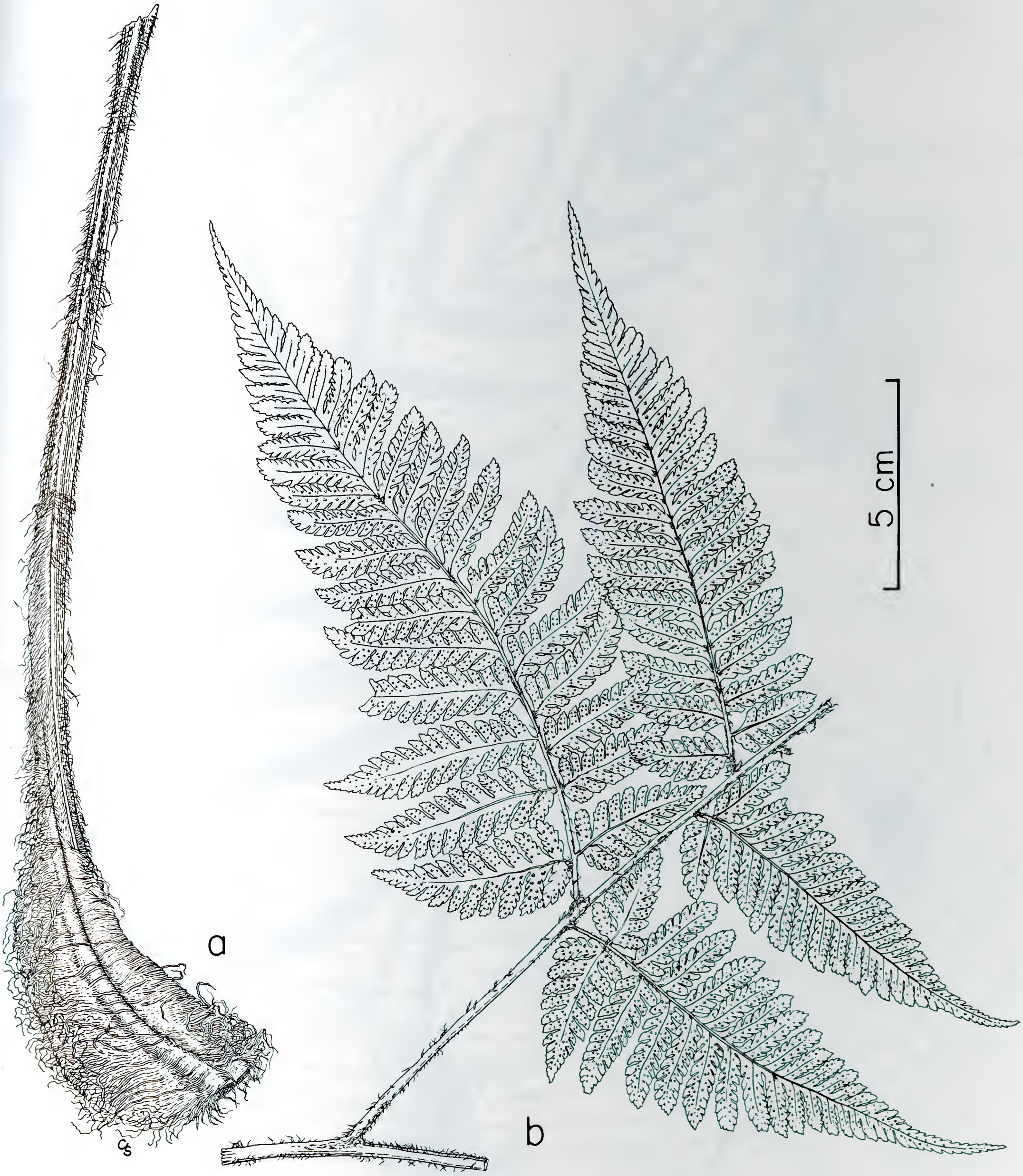

FIGURE 30. *Ctenitis excelsa* (Desv.) Proctor, *21869*: a, stipe base; b, base of lowermost pinna.

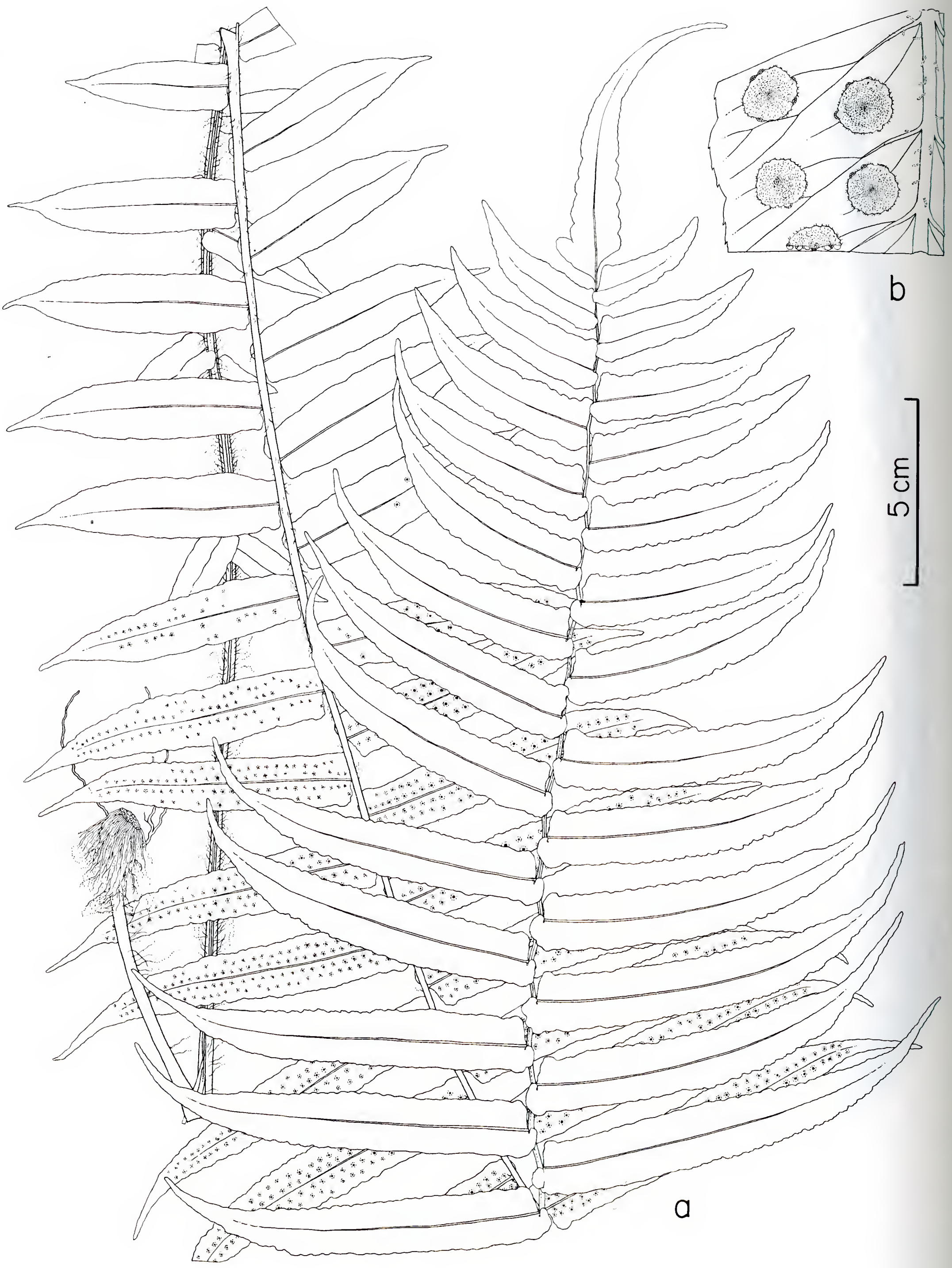

FIGURE 31. *Cyclopeltis semicordata* (Swartz) J. Smith, *28577*: a, habit; b, sori, with peltate indusium.

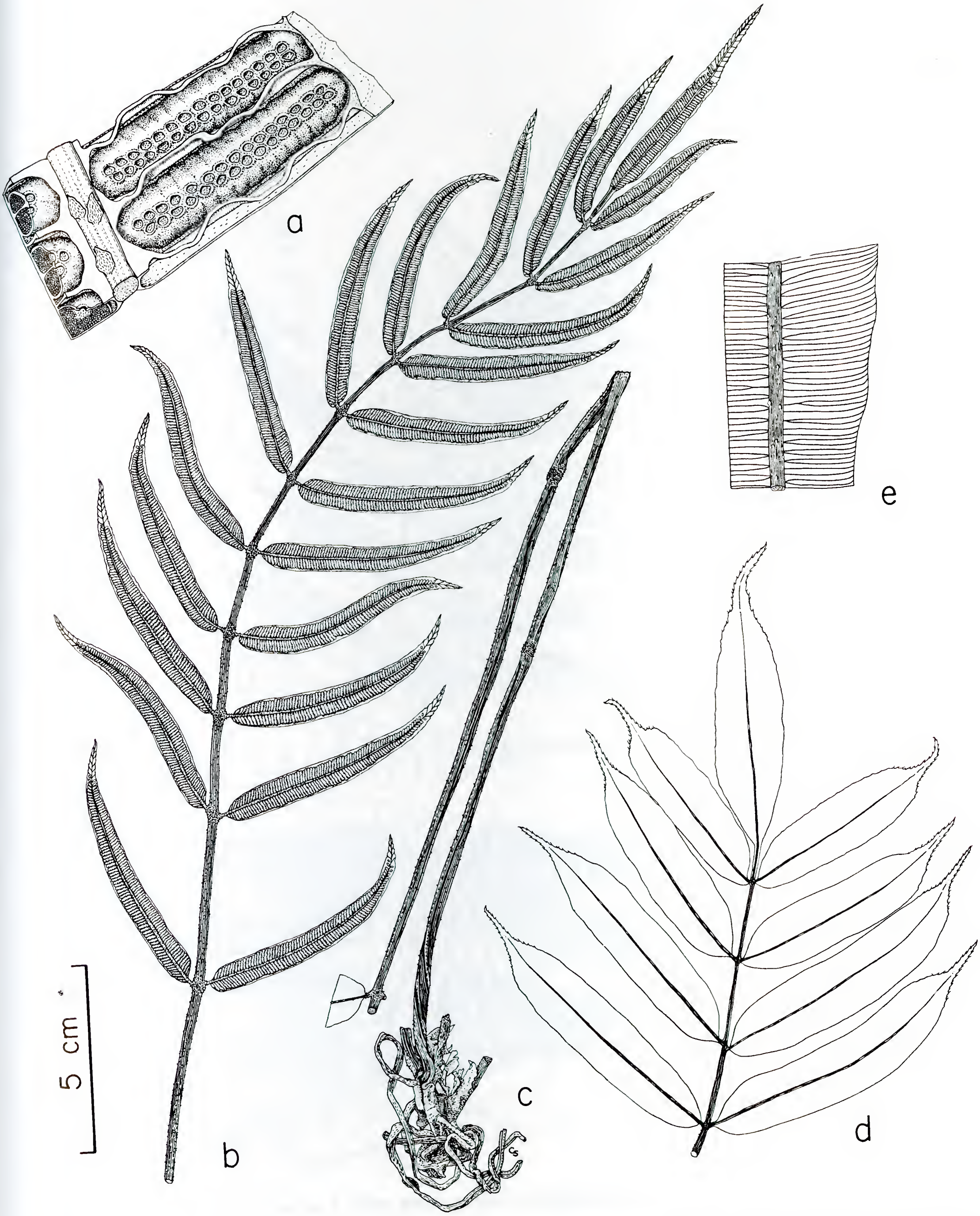

FIGURE 32. *Danaea cuspidata* Liebm., *Münch 159* (DS): a, synangia; b, fertile frond; c, rhizome and stipe base; d, apex of sterile frond; e, venation of sterile frond.

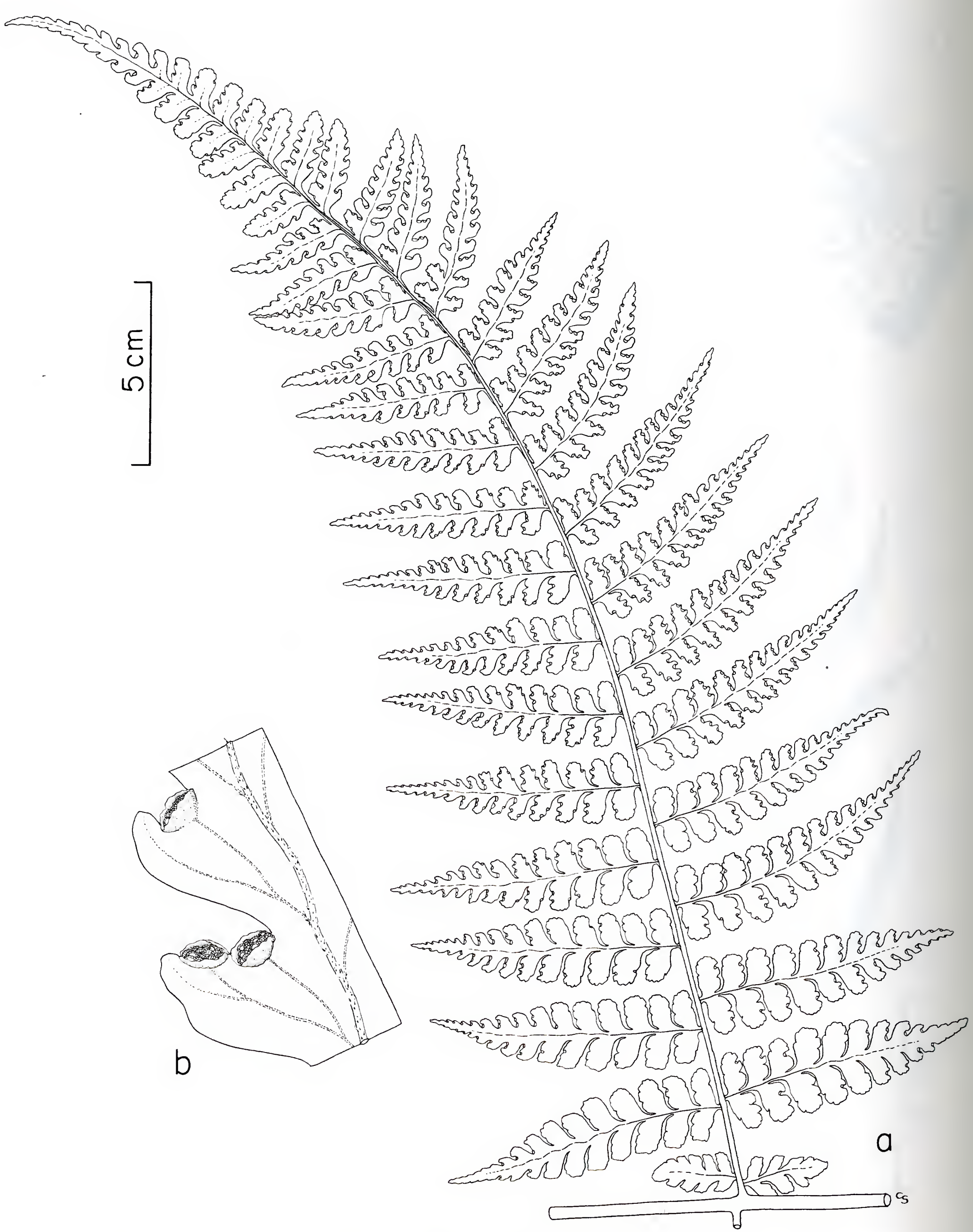

FIGURE 33. *Dennstaedtia dissecta* (Swartz) Moore, *31619*: a, lower pinna; b, ultimate segment, showing sori.

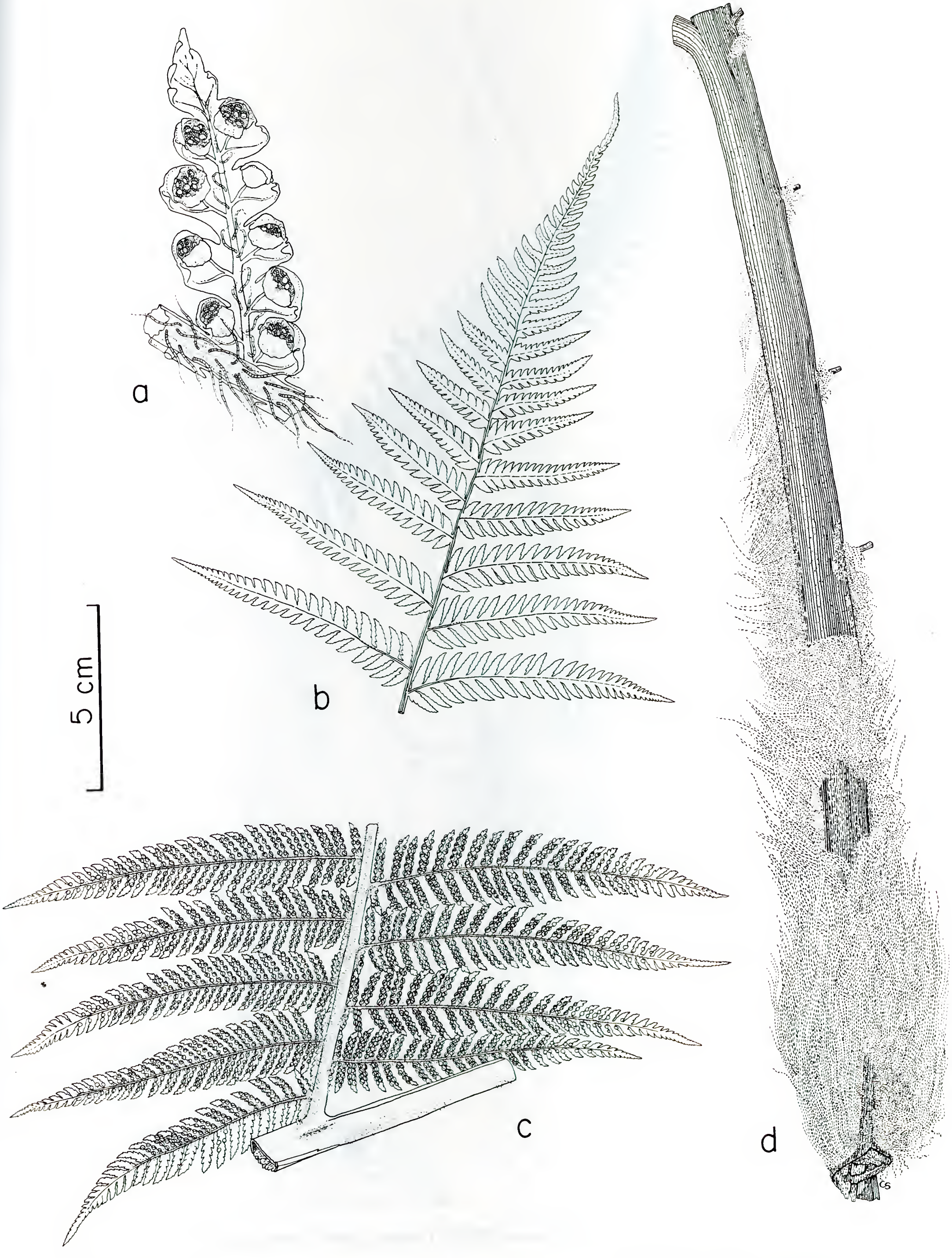

FIGURE 34. *Dicksonia gigantea* Karst., *23214*: a, sori; b, apex of pinna; c, base of pinna; d, stipe base.

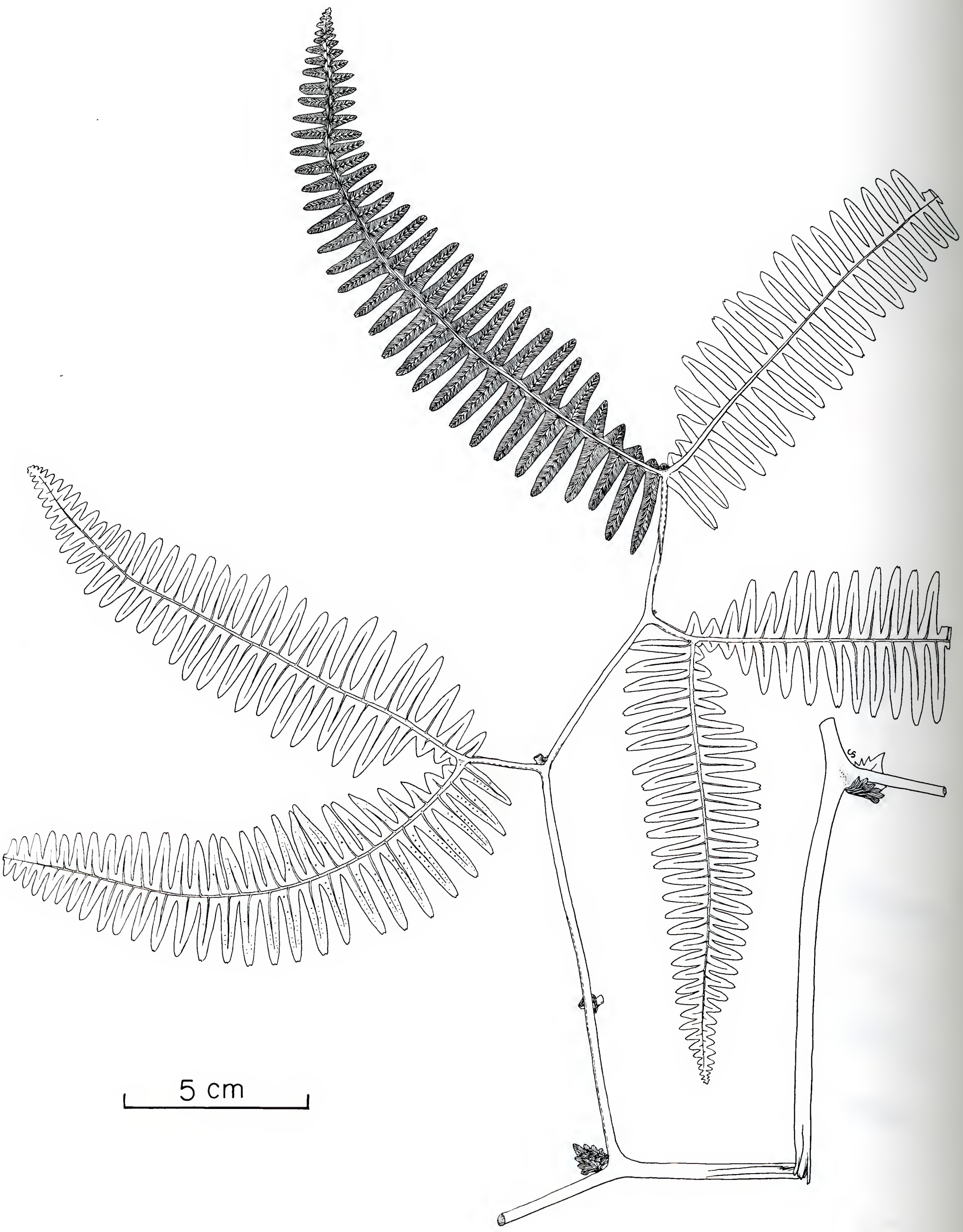

FIGURE 35. *Dicranopteris pectinata* (Willd.) Underw., *42093,* portion of lamina.

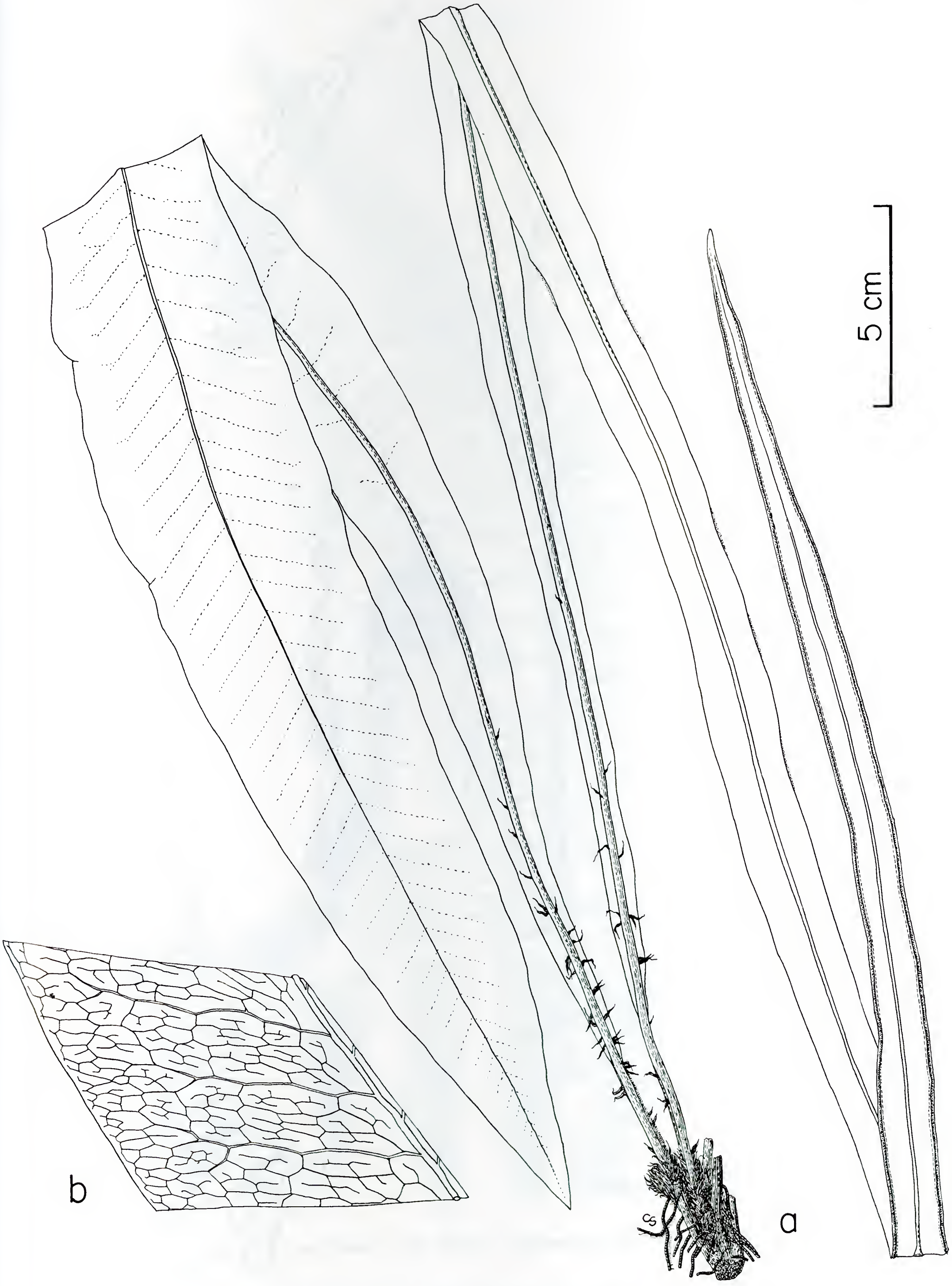

FIGURE 36. *Dictyoxiphium panamense* Hook., *34167*: a, habit; b, venation of sterile frond.

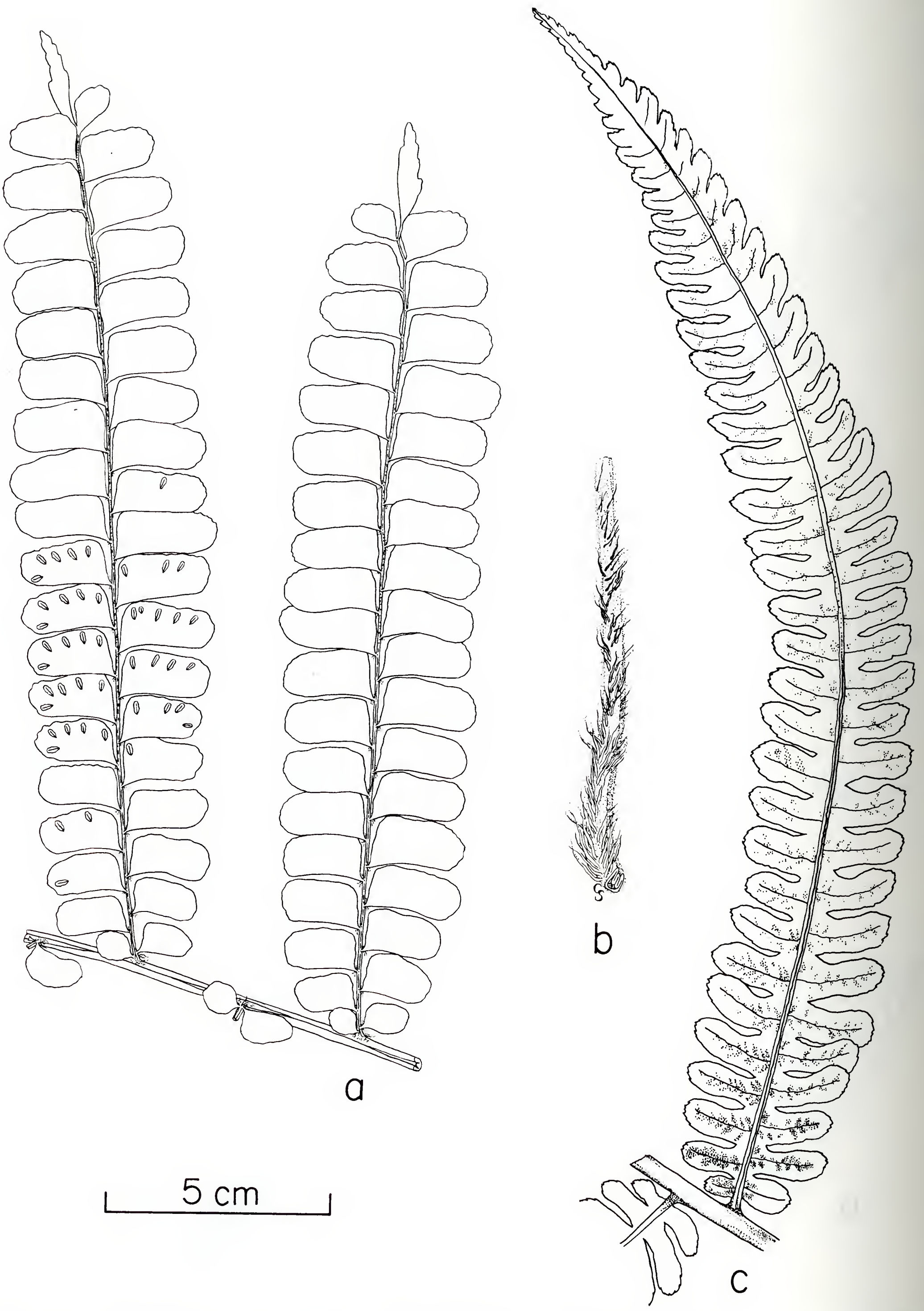

FIGURE 37. *Didymochlaena truncatula* (Swartz) J. Smith, *32902*: a, lower pinnae; b, stipe base. —*Diplazium lindbergii* (Mett.) Christ, *Münch 127* (DS): c, lower pinna.

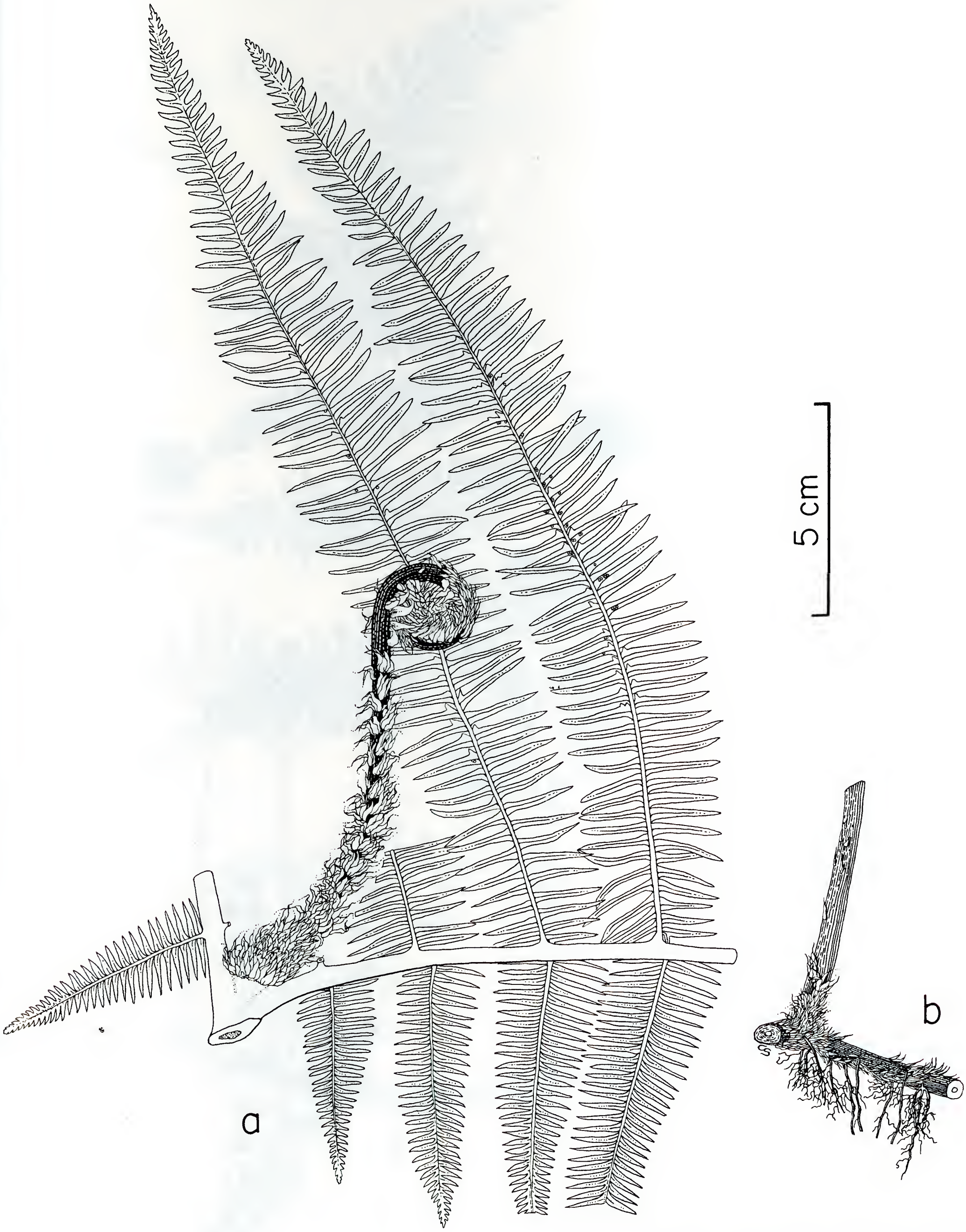

FIGURE 38. *Diplopterygium bancroftii* (Hook.) A. R. Smith. a, portion of lamina, *31645*; b, rhizome and stipe base, *23118*.

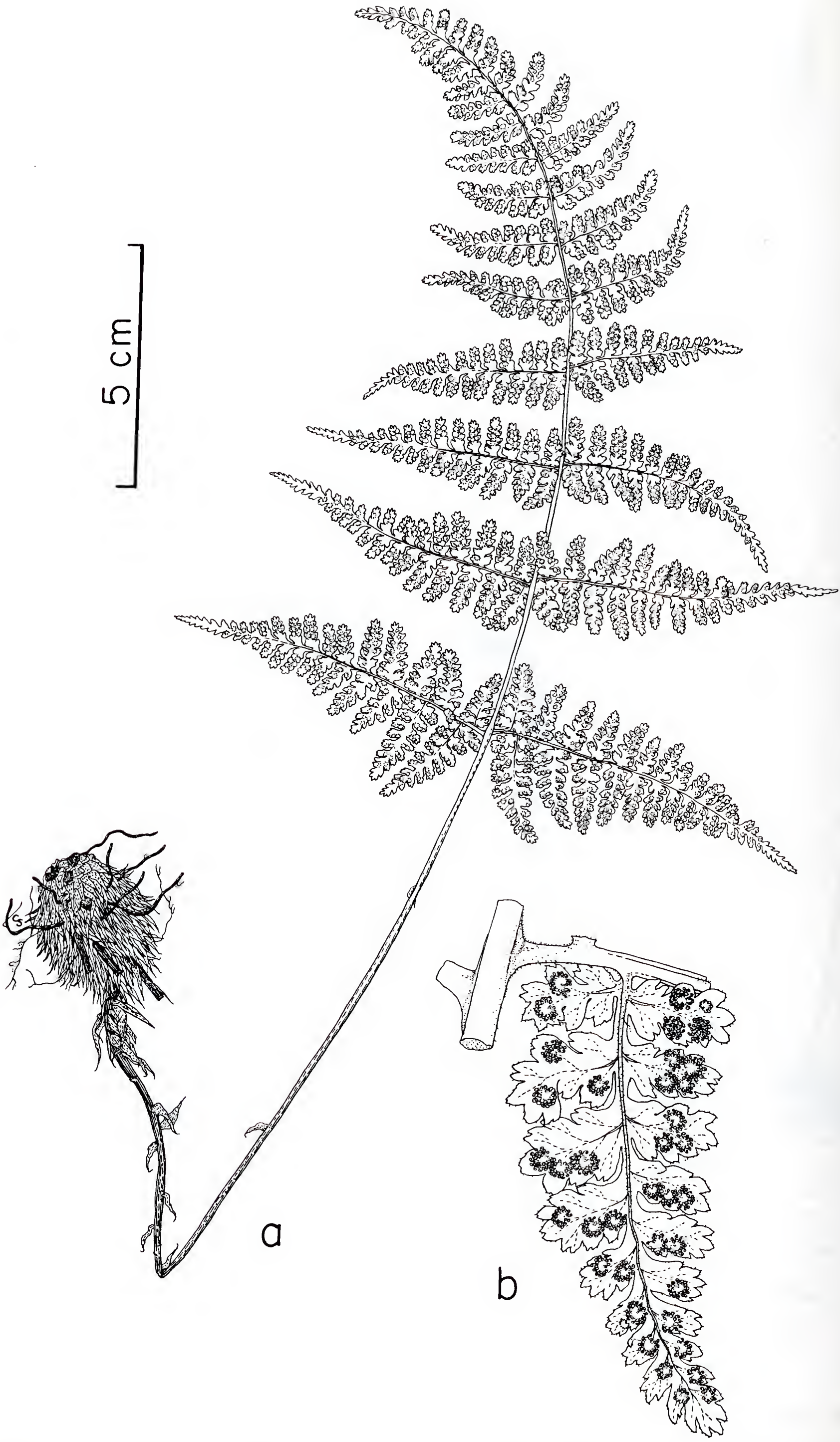

FIGURE 39. *Dryopteris nubigena* Maxon & Morton, *22933*: a, habit; b, pinnule, showing sori and indusia.

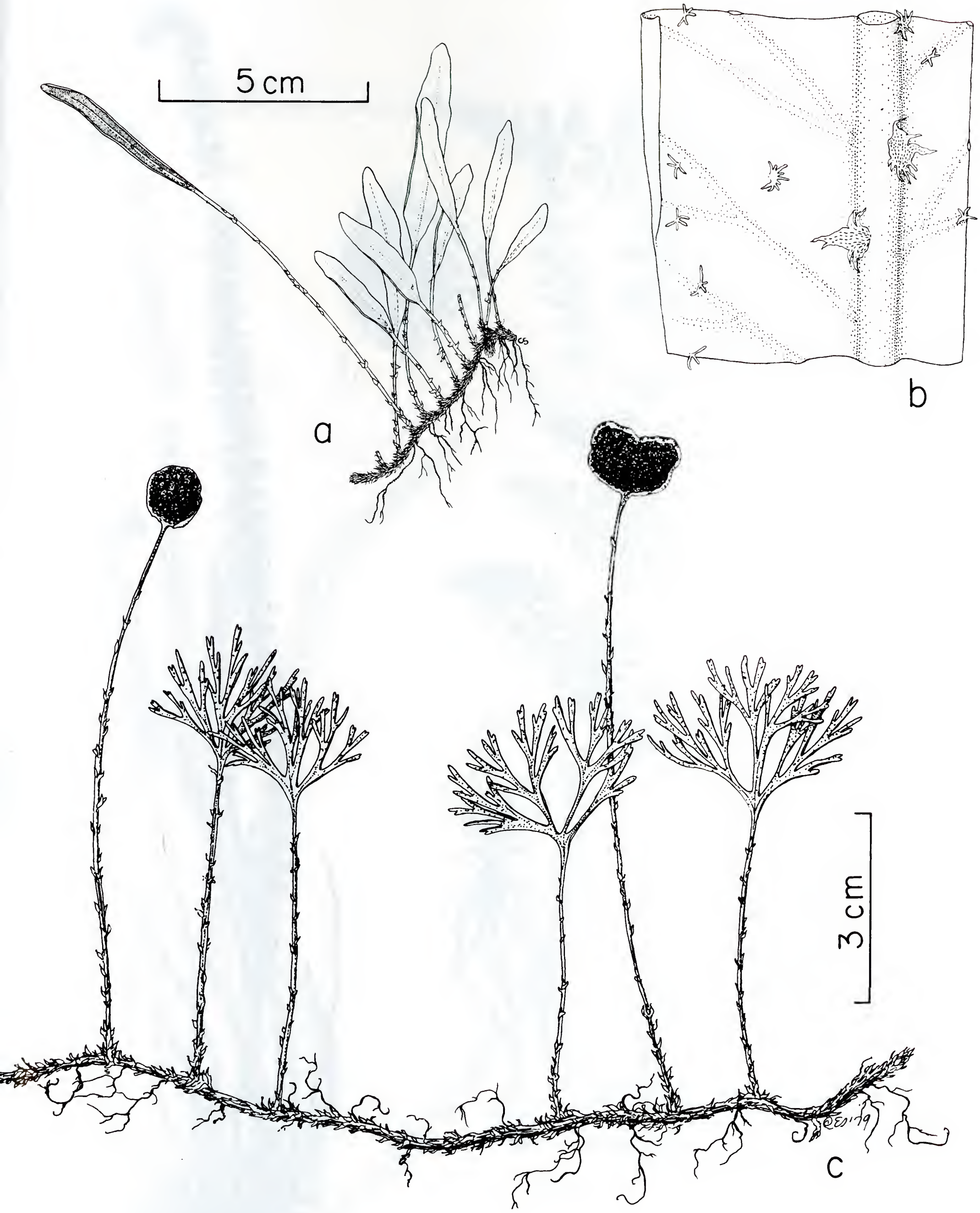

FIGURE 40. *Elaphoglossum revolutum* (Liebm.) Moore, *27432*: a, habit; b, underside of lamina. —*Peltapteris peltata* (Swartz) Morton, *33587*: c, habit.

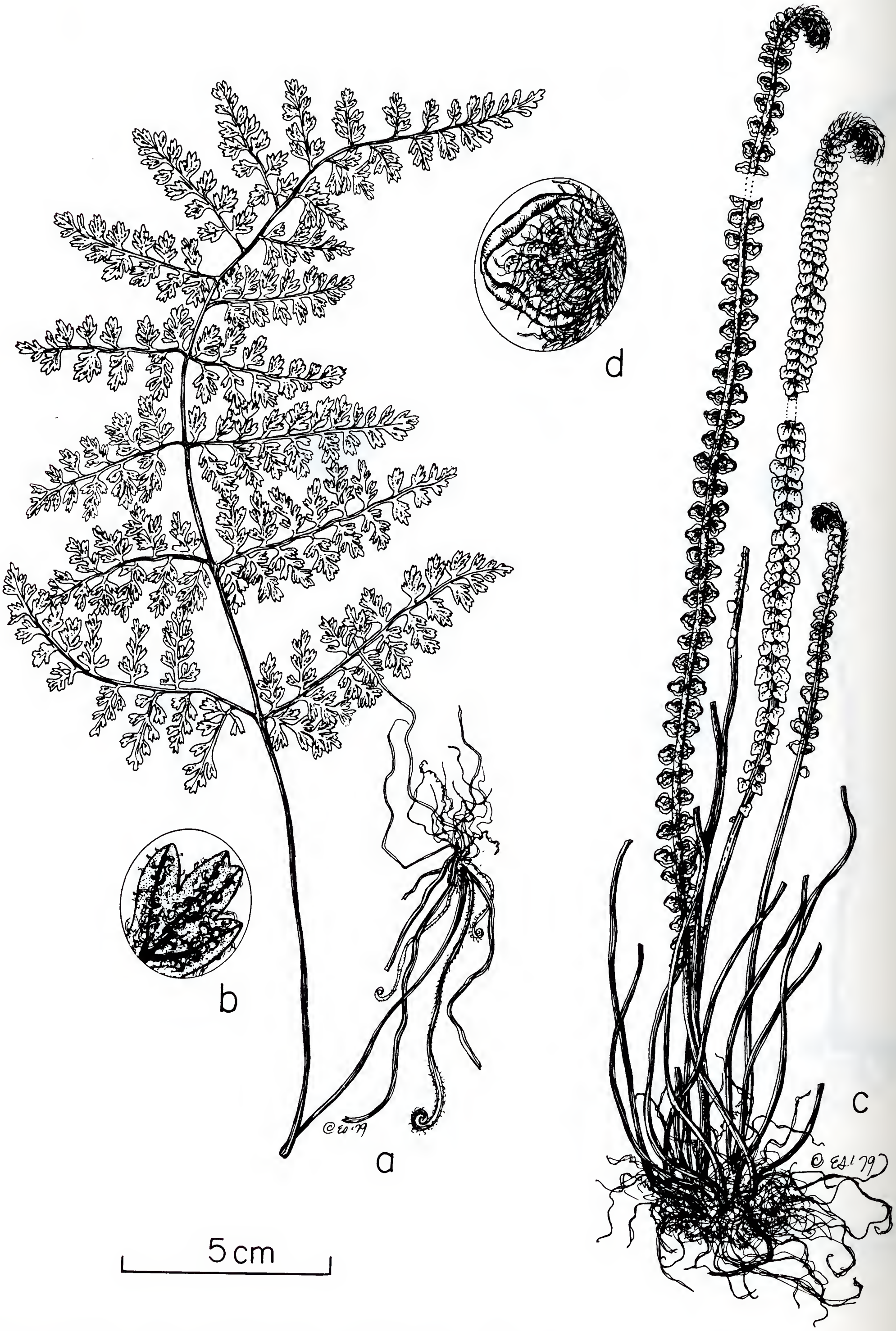

FIGURE 41. *Eriosorus hirtus* (H.B.K.) Copel., *31948*: a, habit; b, ultimate segment, with sporangia along veins. —*Jamesonia alstonii* A. F. Tryon, *8611, 24314*: c, habit; d, pinna.

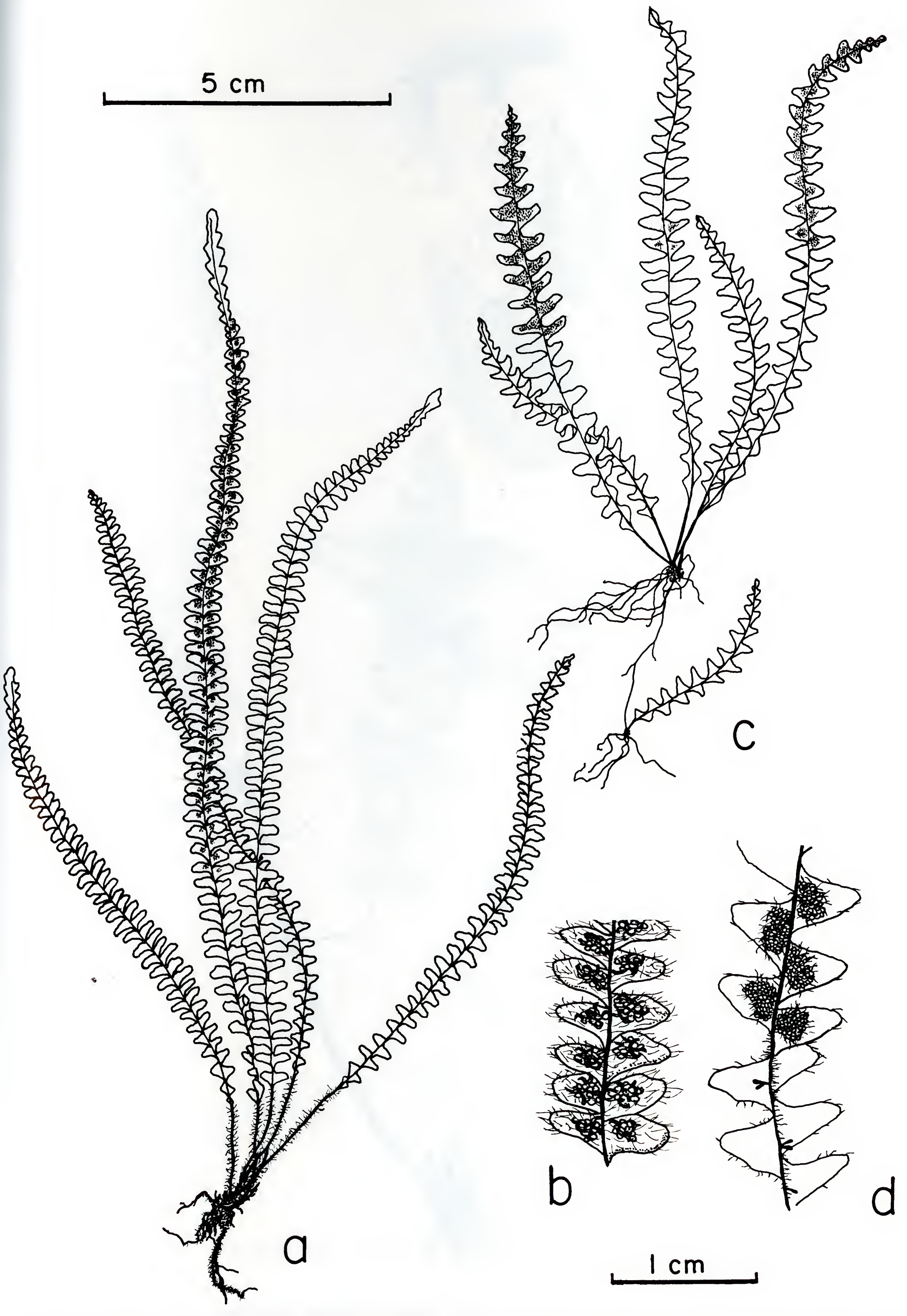

Figure 42. *Grammitis blepharodes* (Maxon) Seymour, *38887*: a, habit; b. portion of lamina. —*Grammitis anfractuosa*

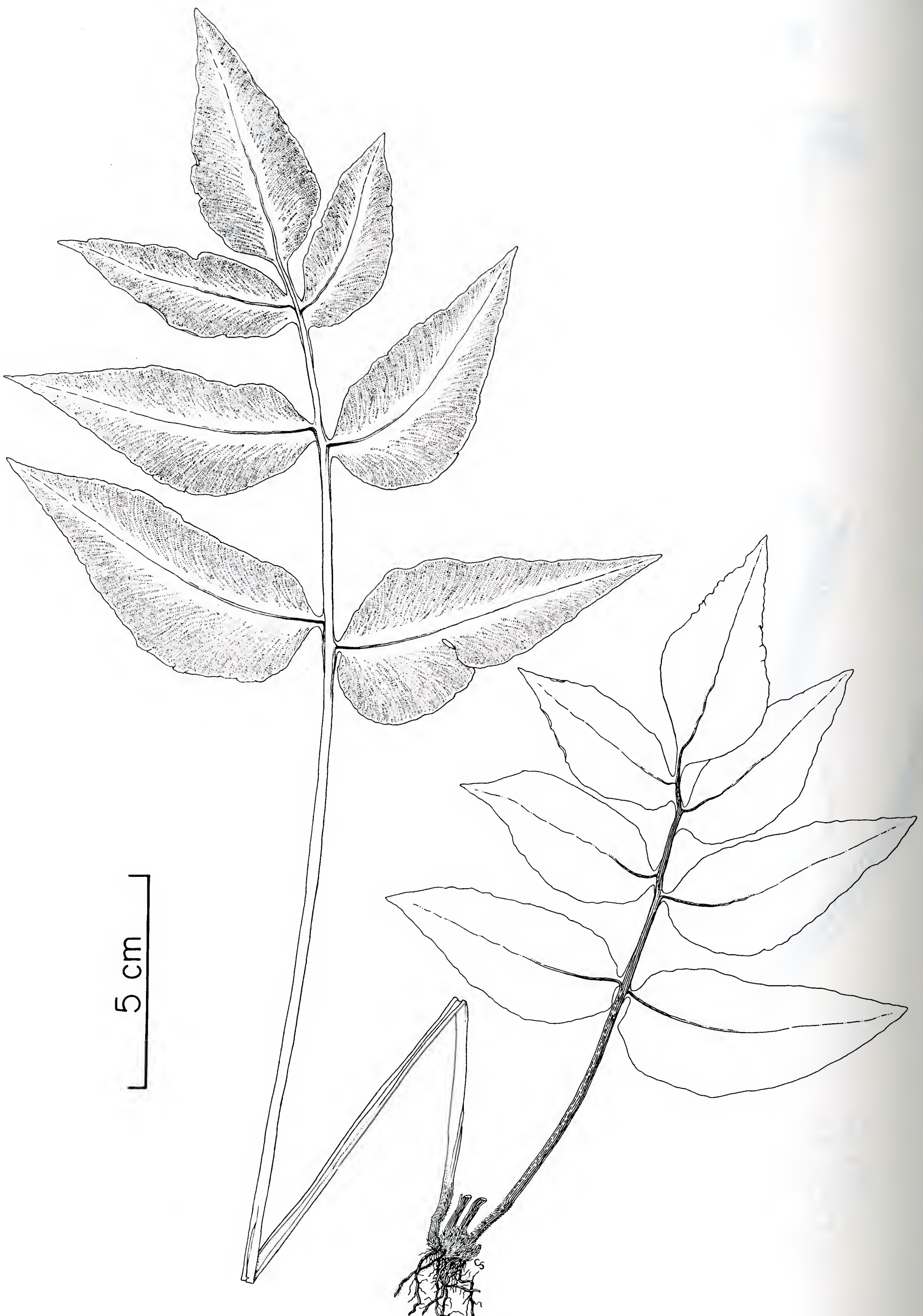

FIGURE 43. *Gymnopteris subcordata* (Davenp.) Underw., *26995*, habit.

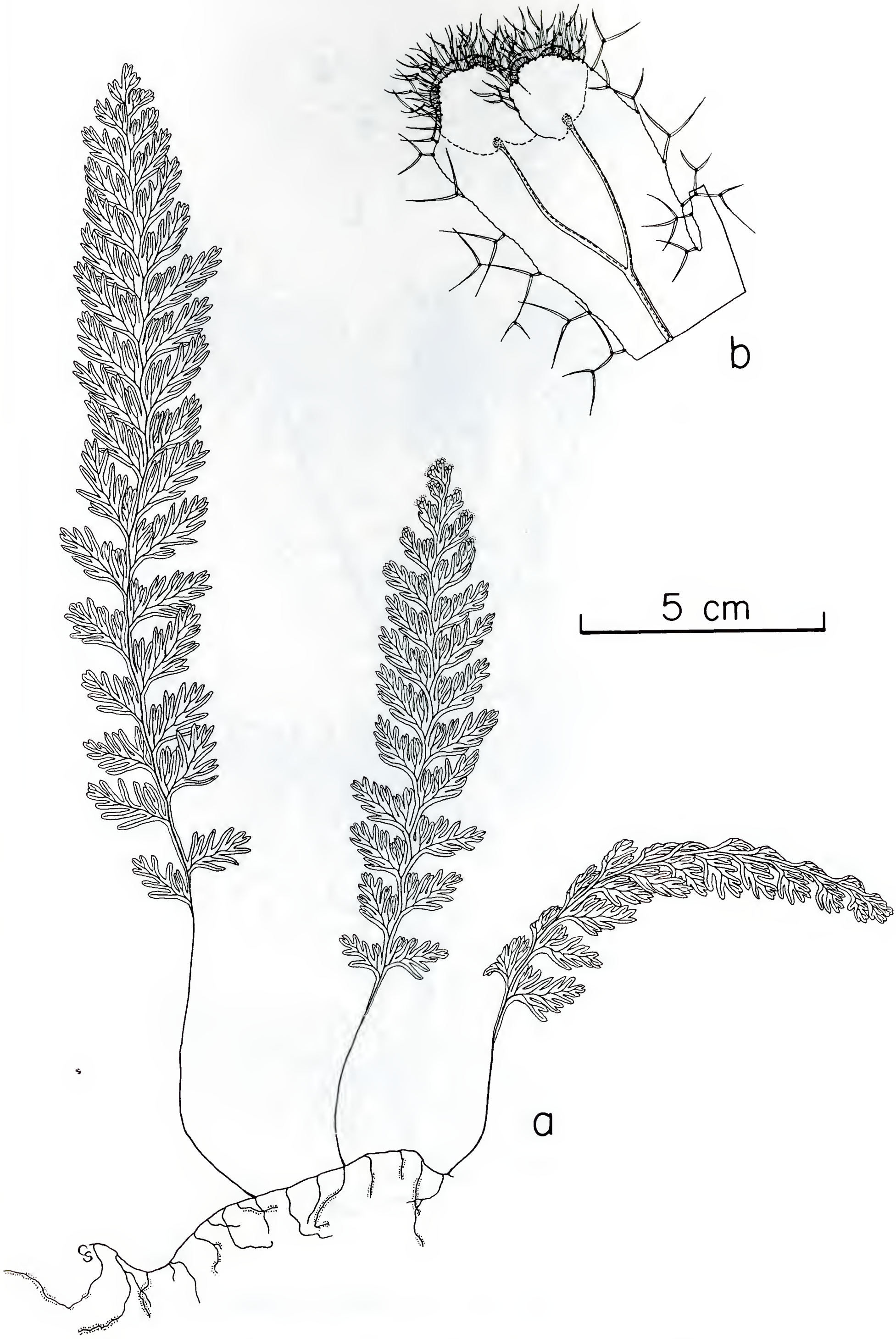

FIGURE 44. *Hymenophyllum trapezoidale* Liebm., *35242*: a, habit; b, ultimate segment with sori.

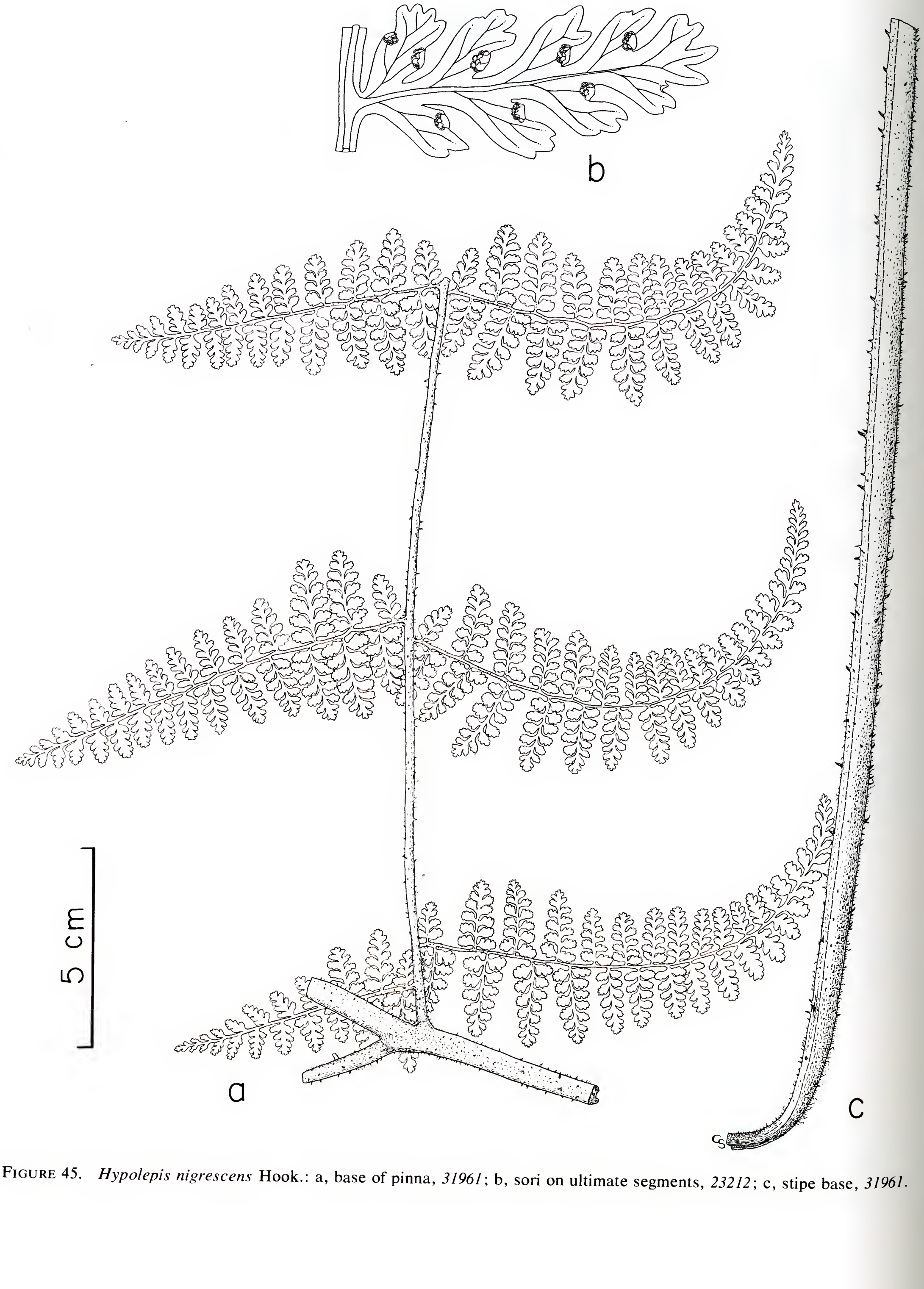

FIGURE 45. *Hypolepis nigrescens* Hook.: a, base of pinna, *31961*; b, sori on ultimate segments, *23212*; c, stipe base, *31961*.

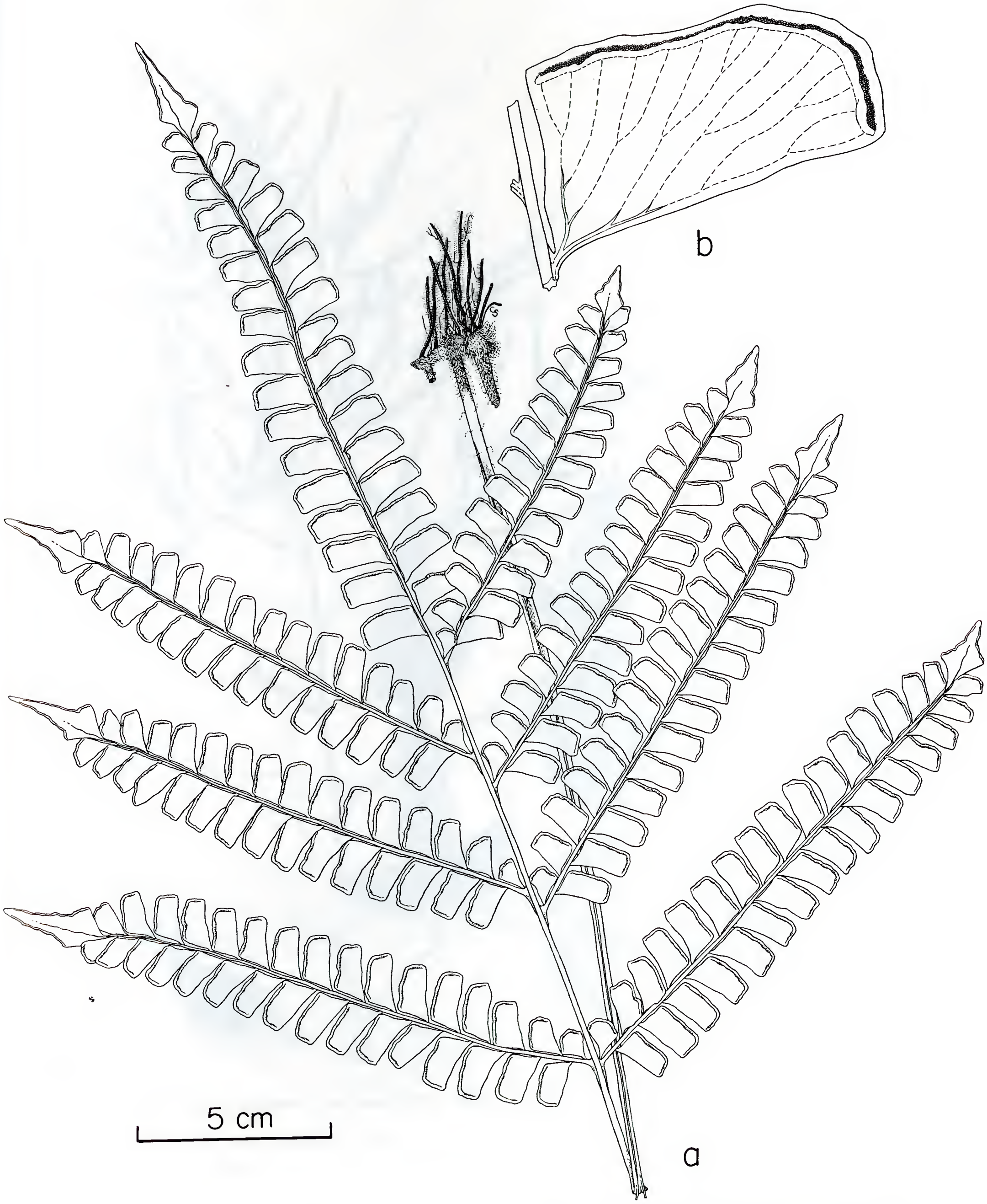

FIGURE 46. *Lindsaea lancea* (L.) Bedd. var. *lancea, 34289*: a, habit; b, pinnule showing marginal sorus.

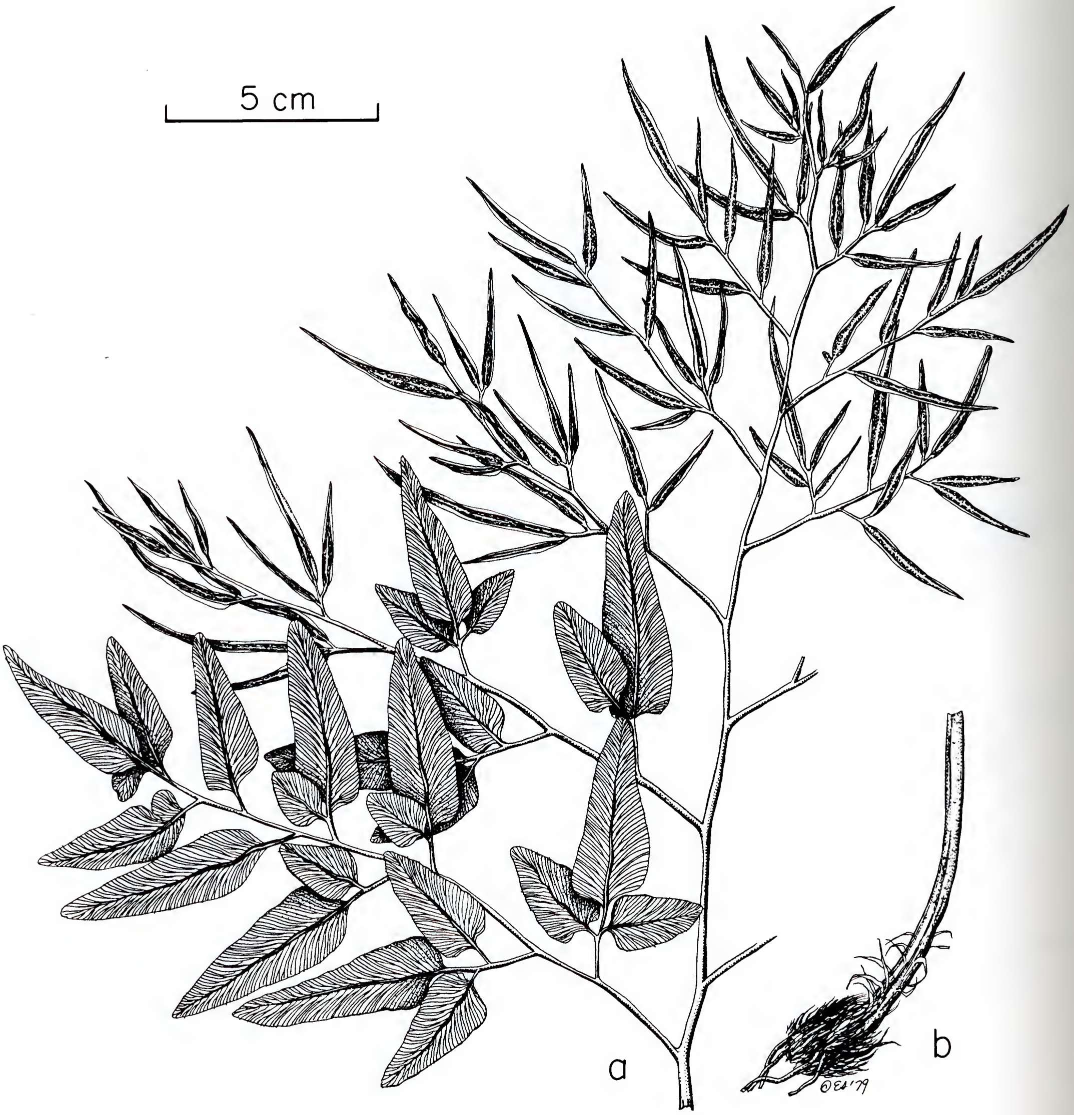

FIGURE 47. *Llavea cordifolia* Lag., *31426, 32309*: a, distal portion of lamina; b, stipe base.

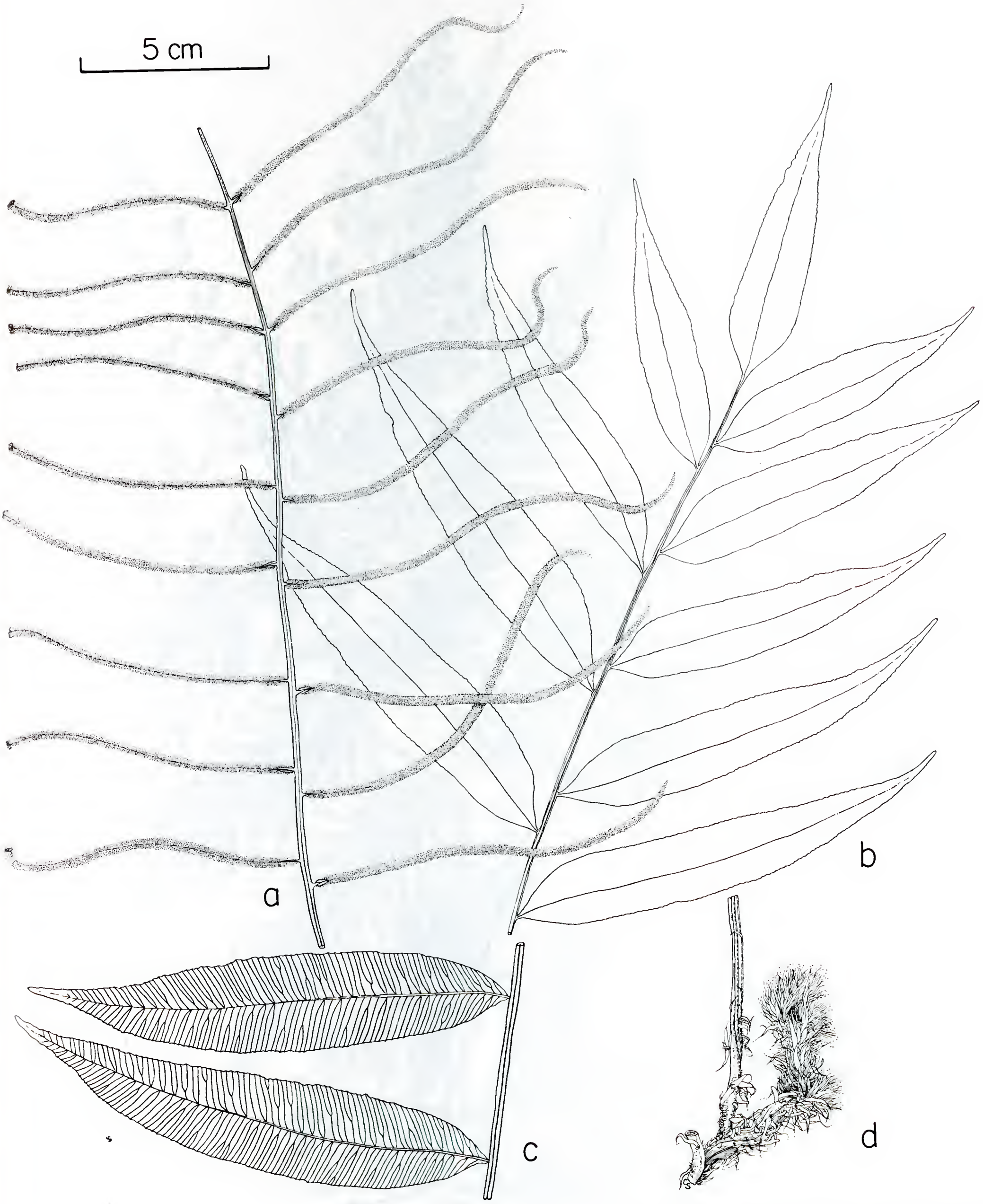

FIGURE 48. *Lomariopsis recurvata* Fée, *34976*: a, portion of fertile frond; b, apex of sterile frond; c, venation of sterile pinnae; c, rhizome and stipe base.

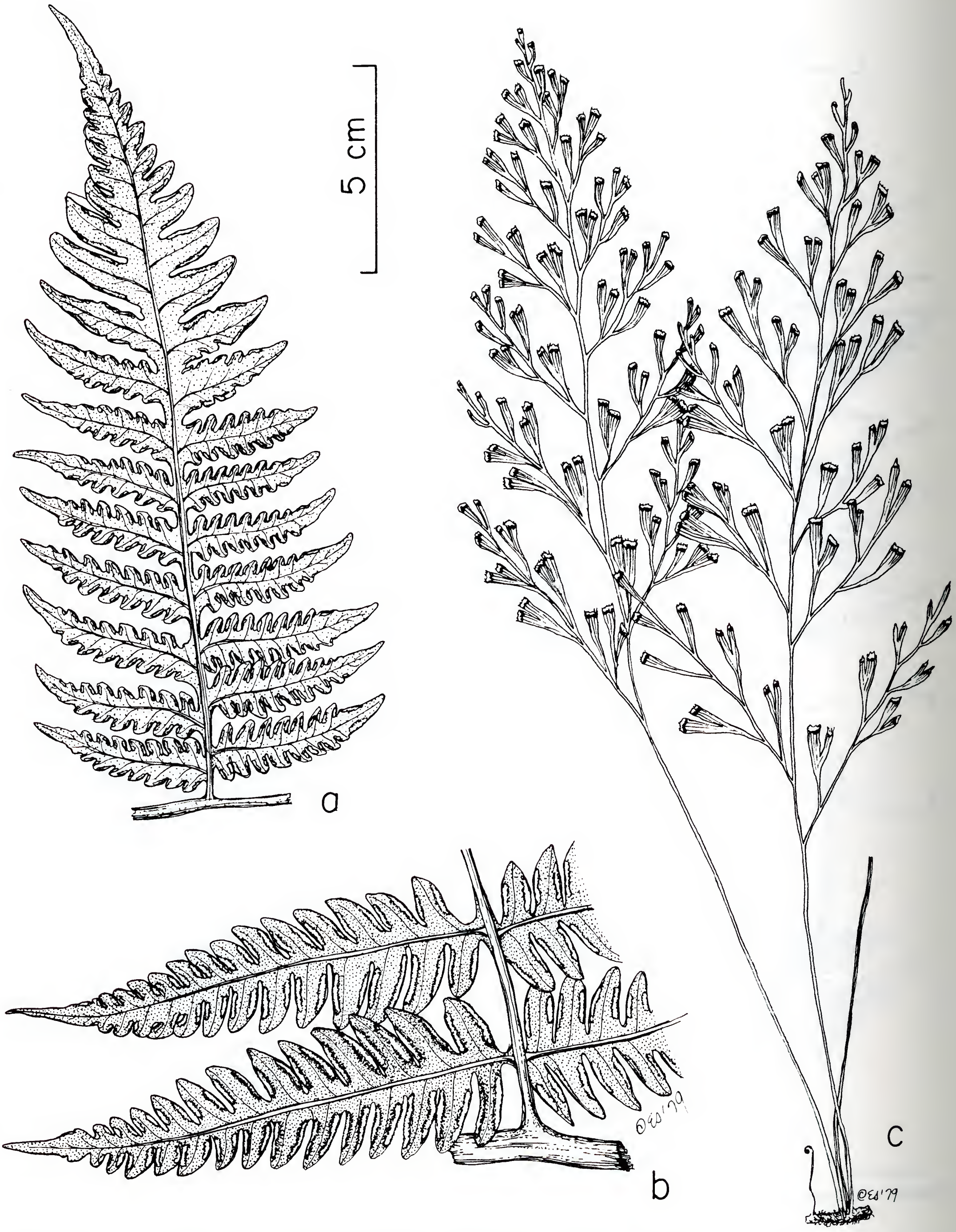

FIGURE 49. *Lonchitis hirsuta* L., *33103, 42100*: a, distal pinna; b, base of lower pinna. —*Sphenomeris clavata* (L.) Maxon, *35262*: c, habit.

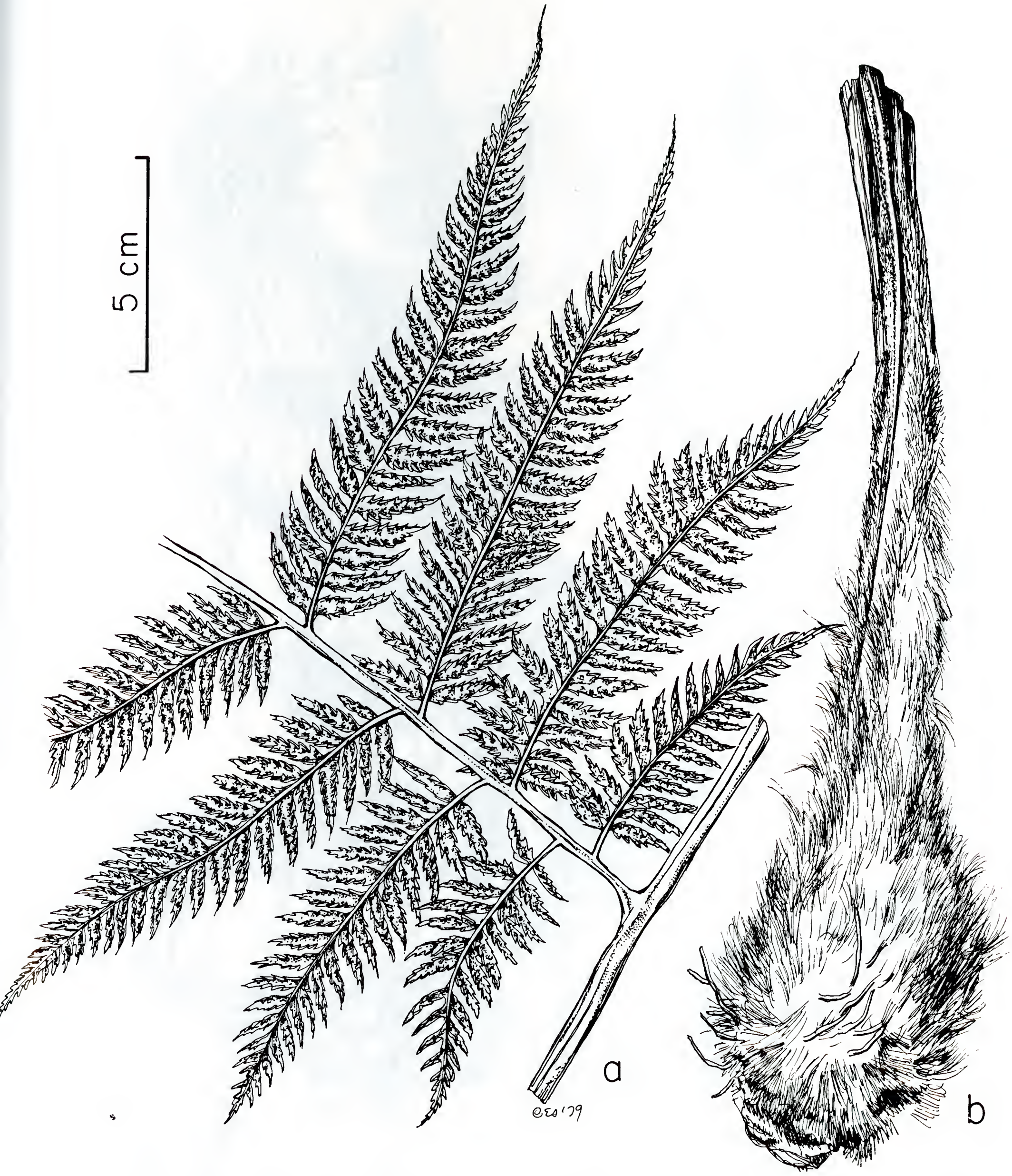

FIGURE 50. *Lophosoria quadripinnata* (Gmel.) C. Chr.: a, pinna base, *22403*; b, rhizome and stipe base, *15314*.

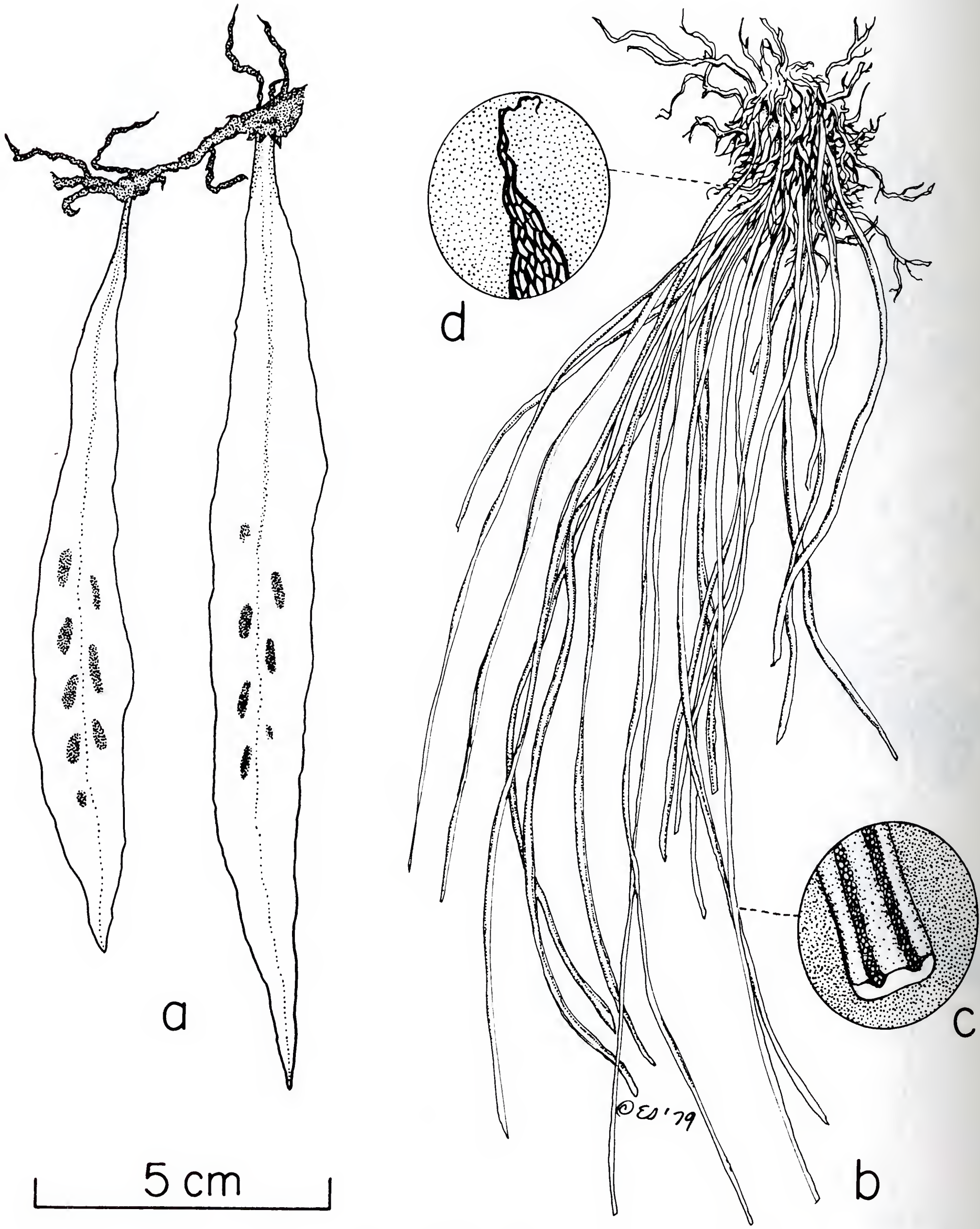

FIGURE 51. *Loxogramme mexicana* (Fée) C. Chr., *25755*: a, habit. —*Vittaria graminifolia* Kaulf., *7808*: b, habit; c, sori; d, portion of clathrate rhizome scale.

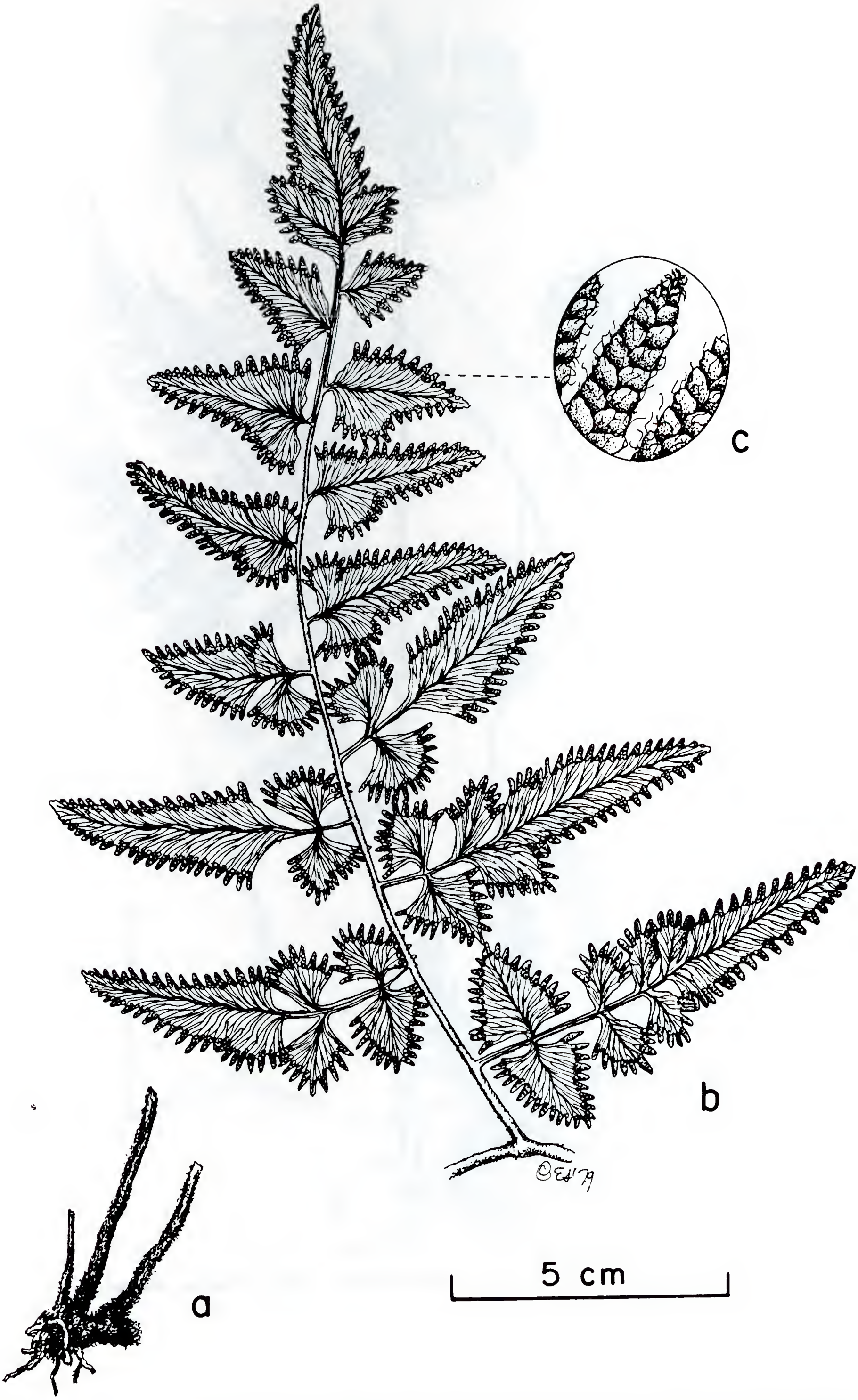

FIGURE 52. *Lygodium venustum* Swartz: a, rhizome and stipe base, *23807*; b, pinna, *36821*; c, fertile lobes (sorophores), *36821*.

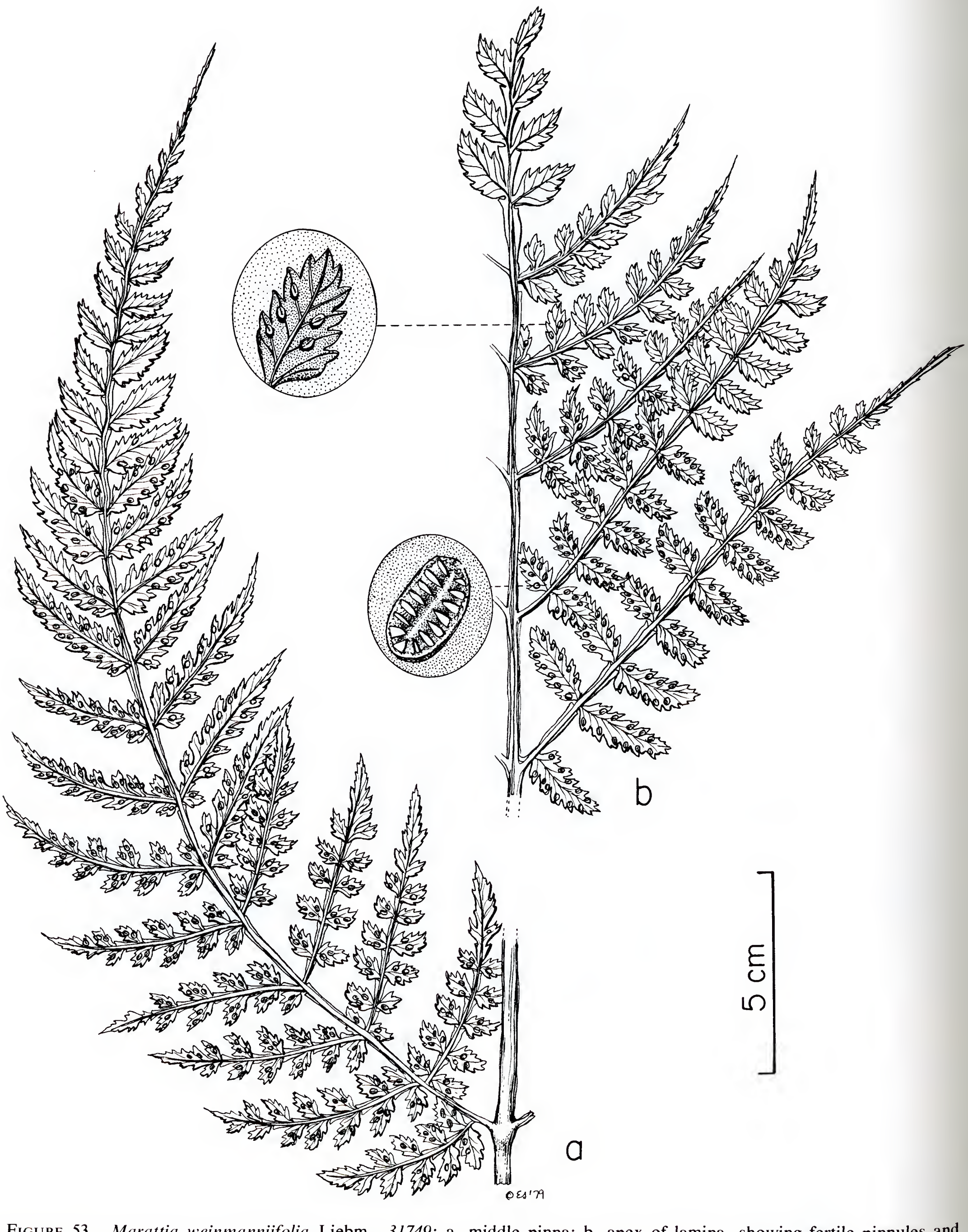

FIGURE 53. *Marattia weinmanniifolia* Liebm., *31749*: a, middle pinna; b, apex of lamina, showing fertile pinnules and synangium.

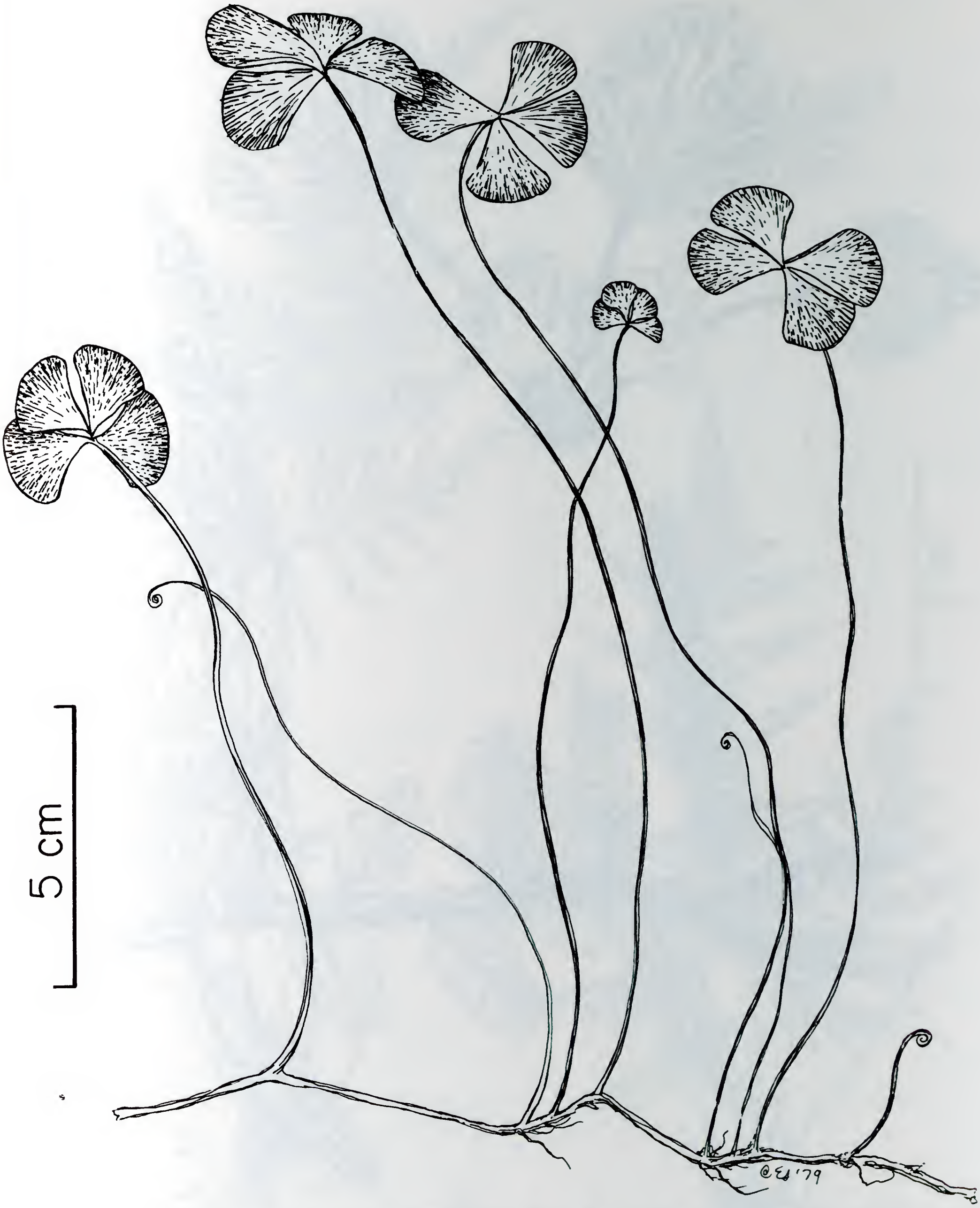

FIGURE 54. *Marsilea mexicana* A. Br., *37135*, habit.

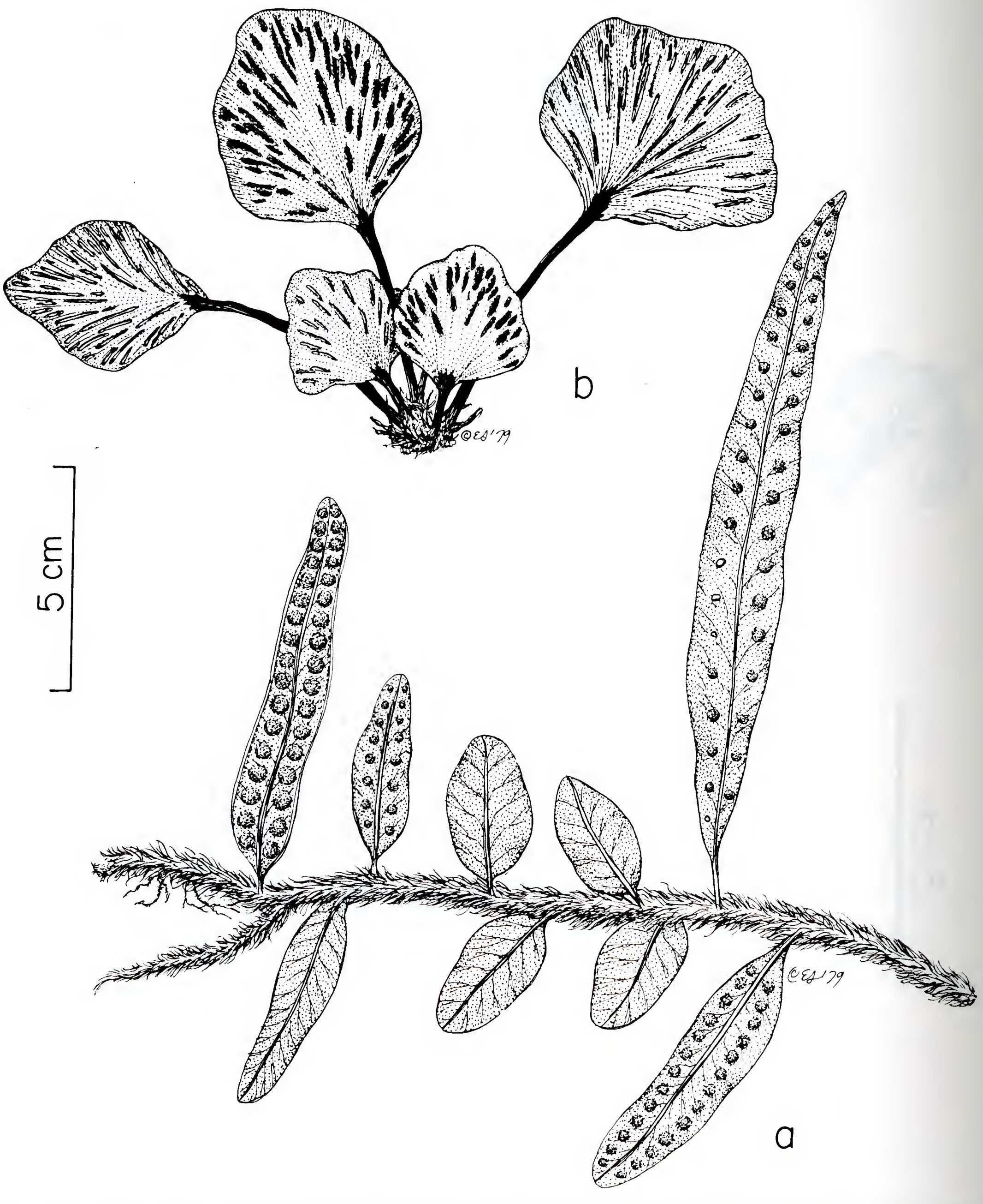

FIGURE 55. *Microgramma nitida* (J. Smith) A. R. Smith, *21971, 33169*: a, habit. —*Schaffneria nigripes* Fée, *29133*: b, habit.

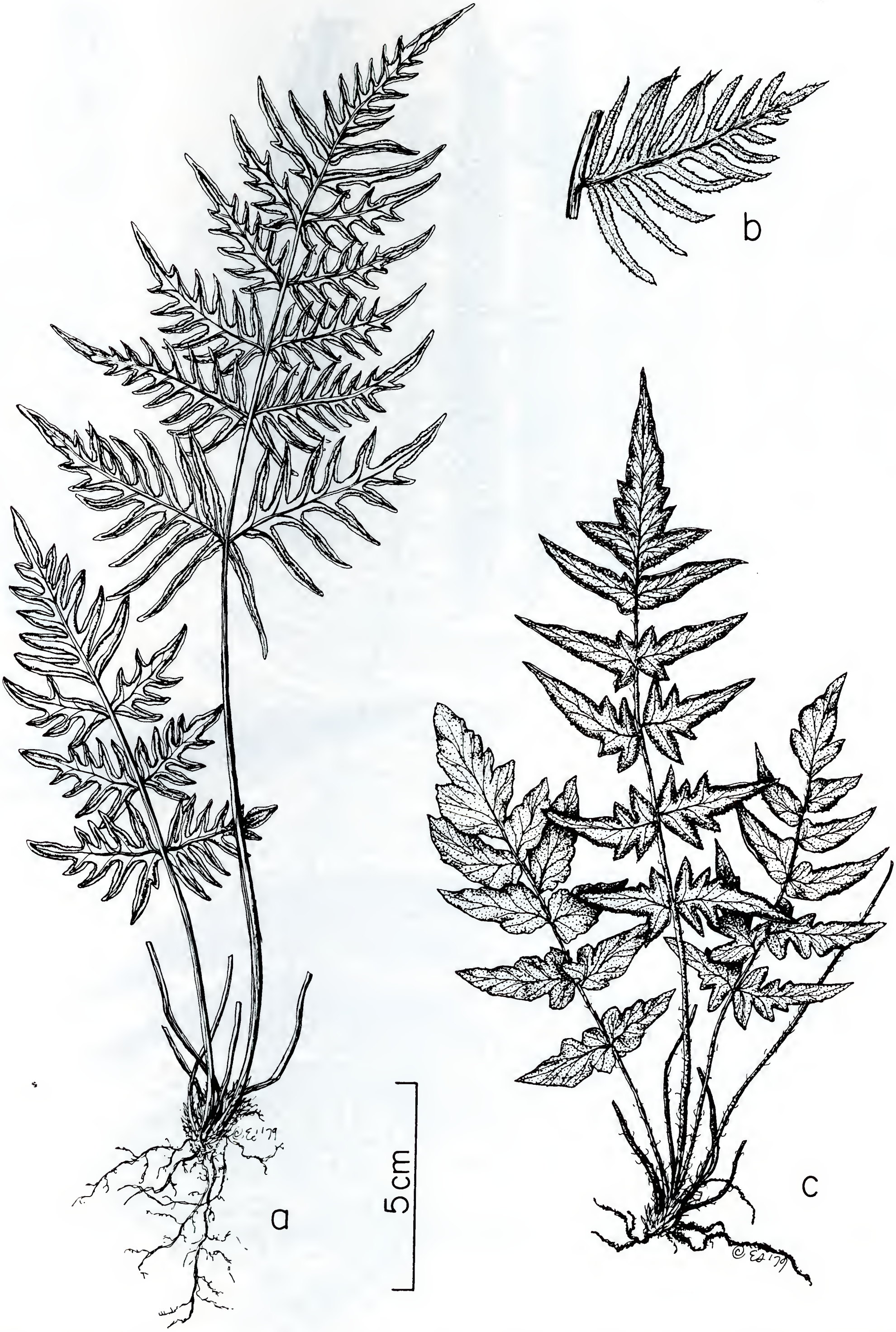

FIGURE 56. *Mildella intramarginalis* (Kaulf. ex Link) Trev. var. *intramarginalis, 41622*: a, habit. —*Mildella intramarginalis* var. *serratifolia* (Hook. & Bak.) Hall & Lellinger, *Münch 65*: b, pinna. —*Pellaea seemannii* Hook., *36811*: c, habit.

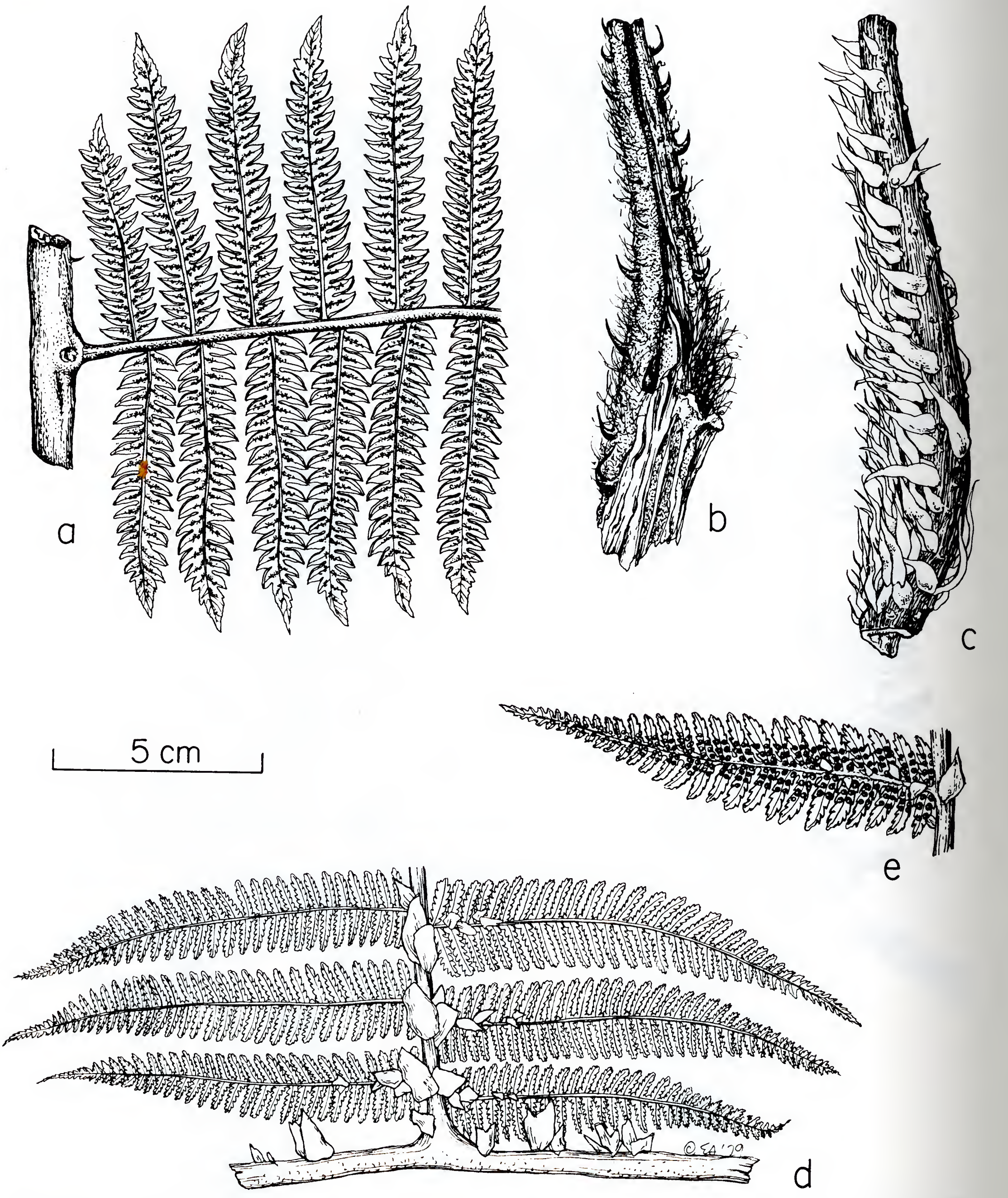

FIGURE 57. *Nephelea mexicana* (Schlecht. & Cham.) Tryon, *32429, 33004*: a, base of pinna; b, stipe base. —*Trichipteris mexicana* (Mart.) Tryon: c, stipe base, *29657*; d, base of pinna, *31957*; e, pinnule, *35251*.

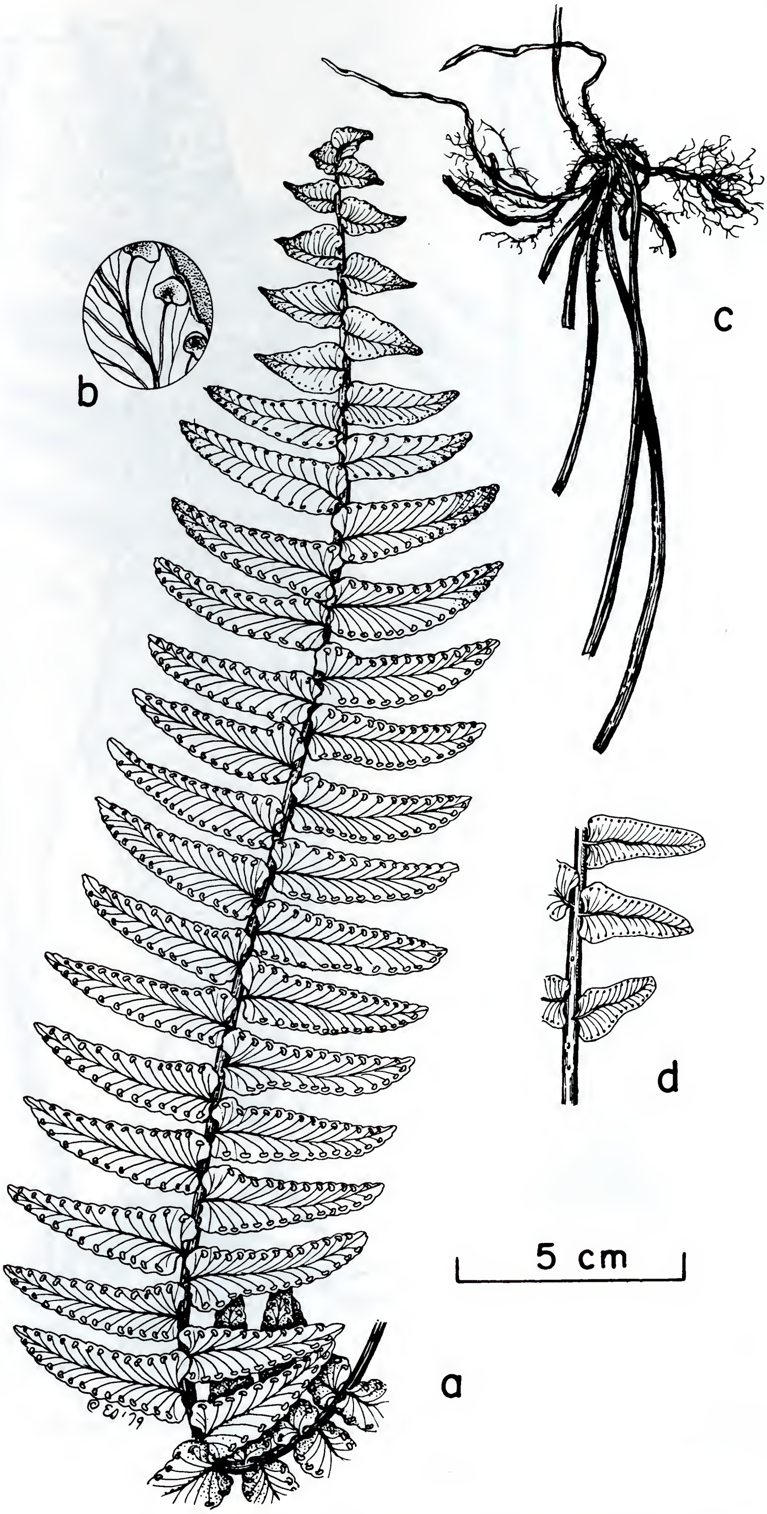

FIGURE 58. *Nephrolepis pendula* (Raddi) J. Smith: a, portion of lamina, *32801*; b, sori, *24035*; c, rhizome and stipe bases, *33140*; d, lower pinnae, *24035*.

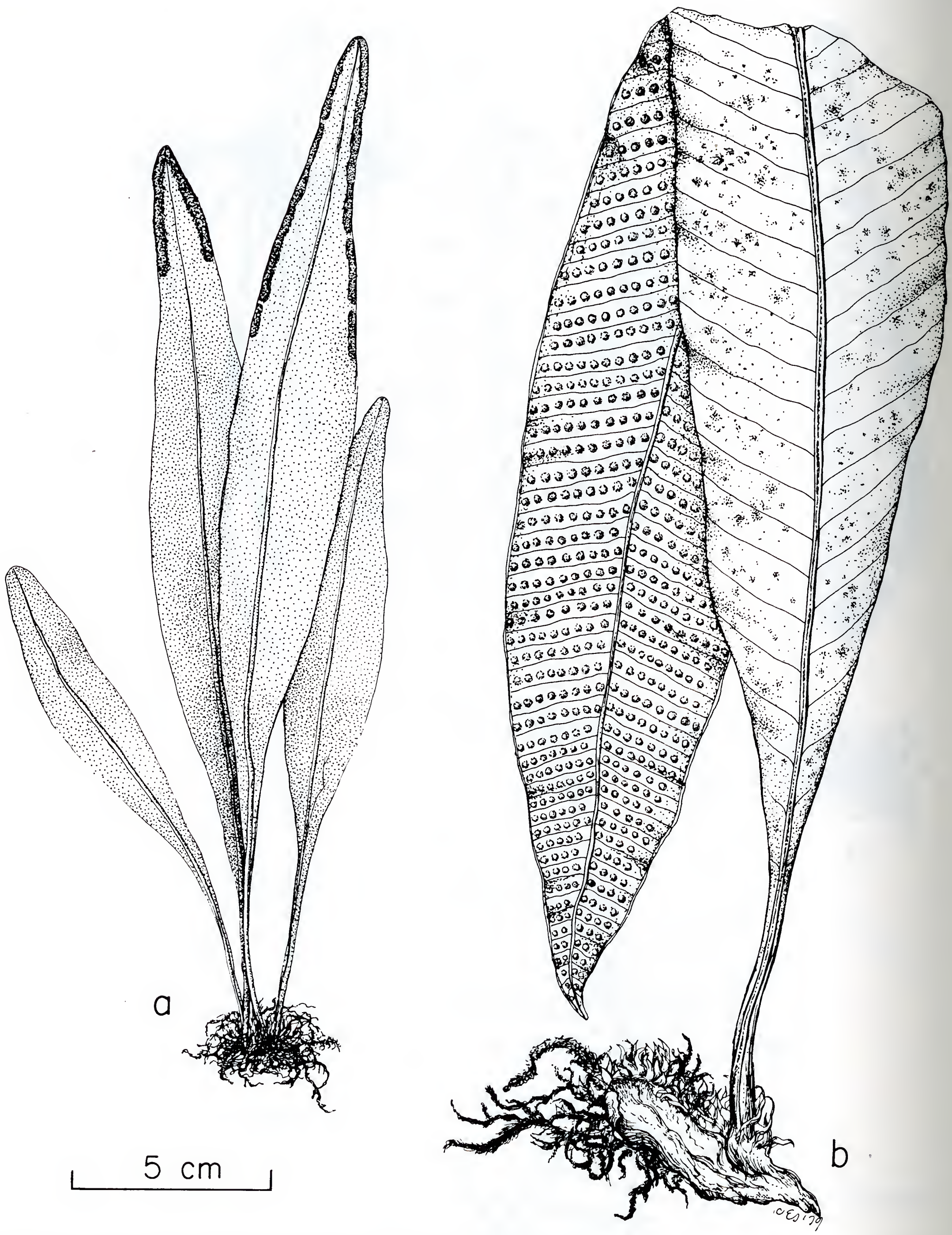

FIGURE 59. *Neurodium lanceolatum* (L.) Fée, *29761* and *Sintenis s.n.* (UC): a, habit. —*Niphidium crassifolium* (L.) Lellinger, *21370, 28910*: b, habit.

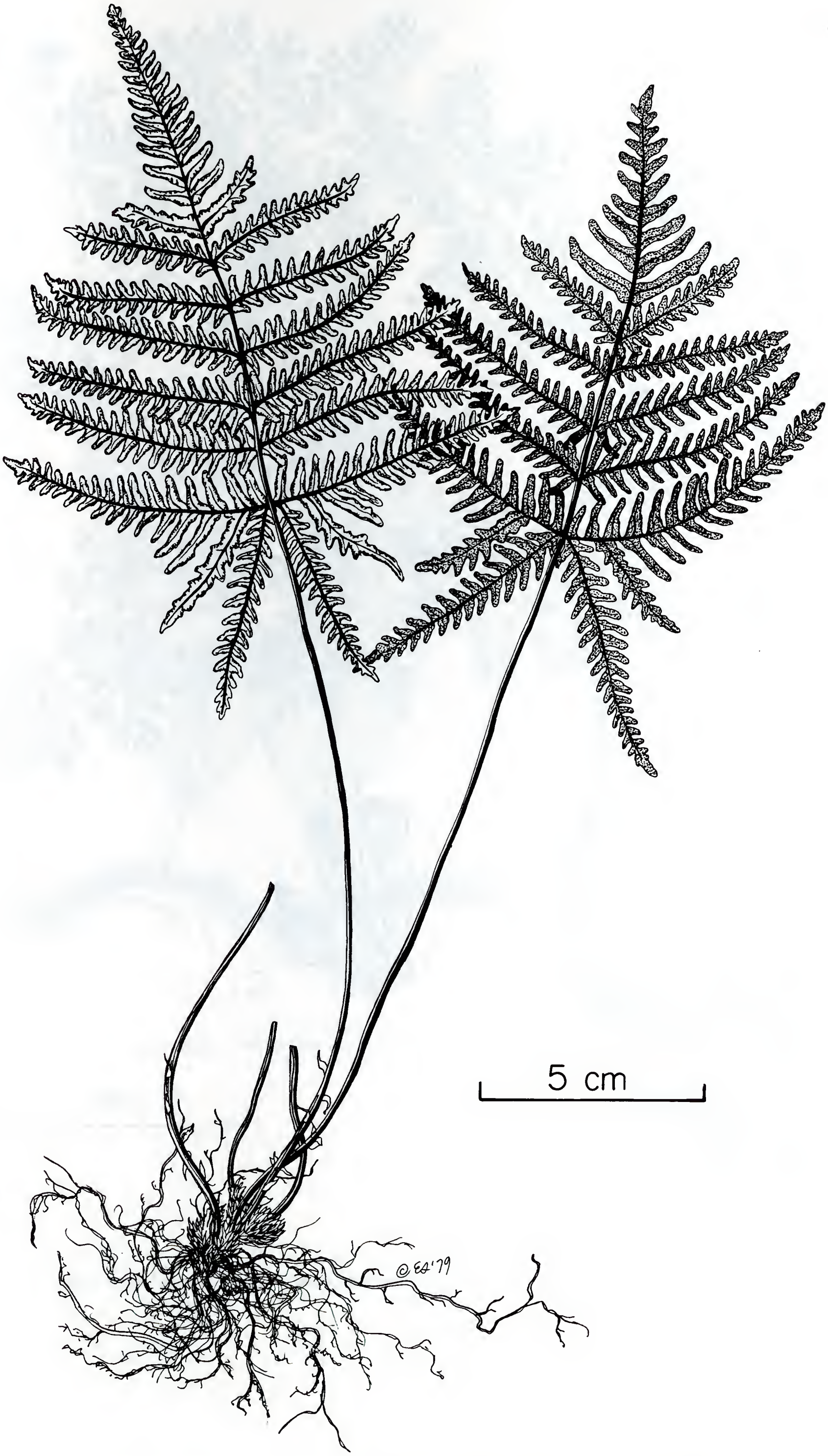

FIGURE 60. *Notholaena candida* (Mart. & Gal.) Hook. var. *candida*, *21577*, habit.

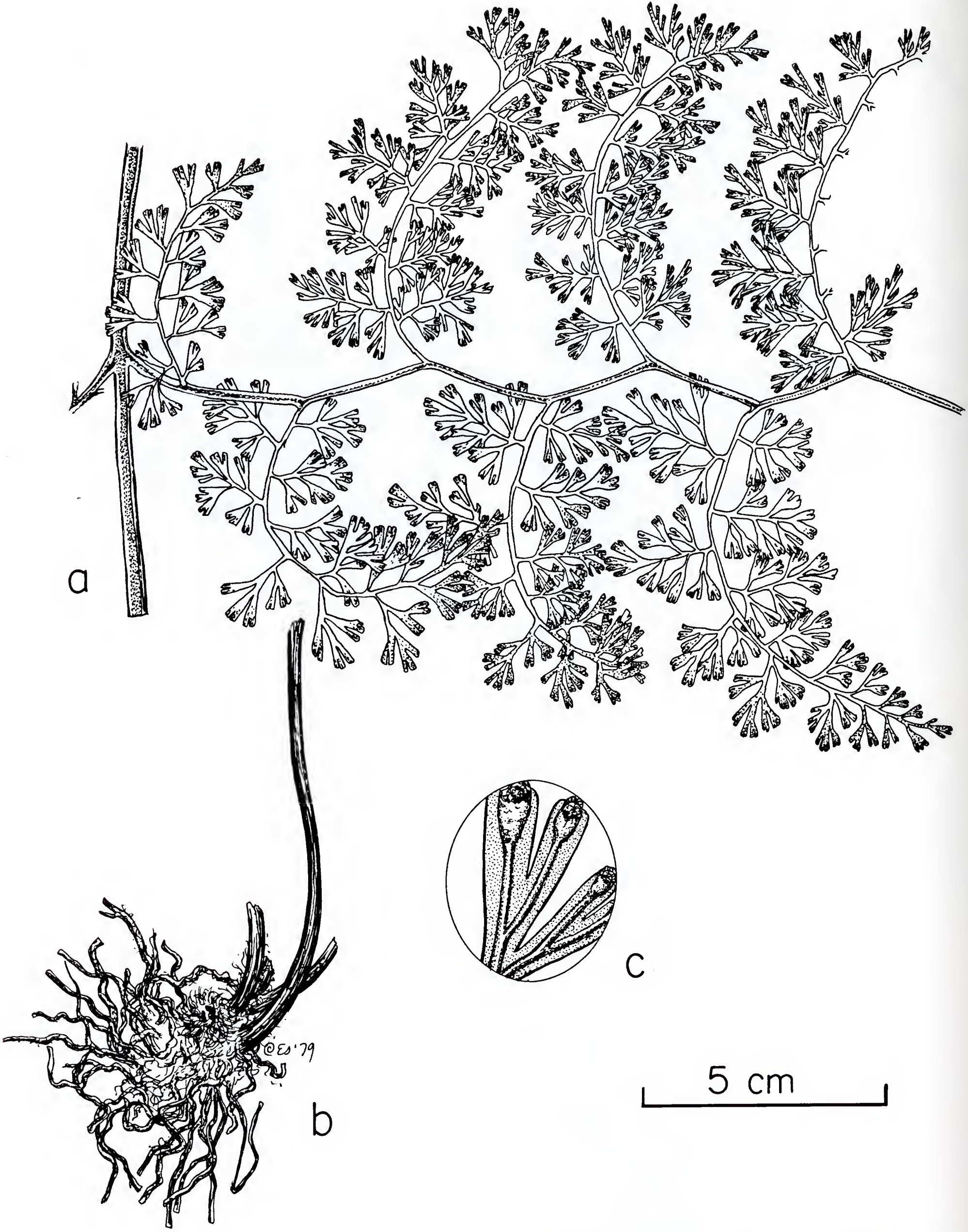

FIGURE 61. *Odontosoria guatemalensis* Christ, *31621*: a, base of pinna; b, rhizome and stipe base; c. ultimate segments with sori.

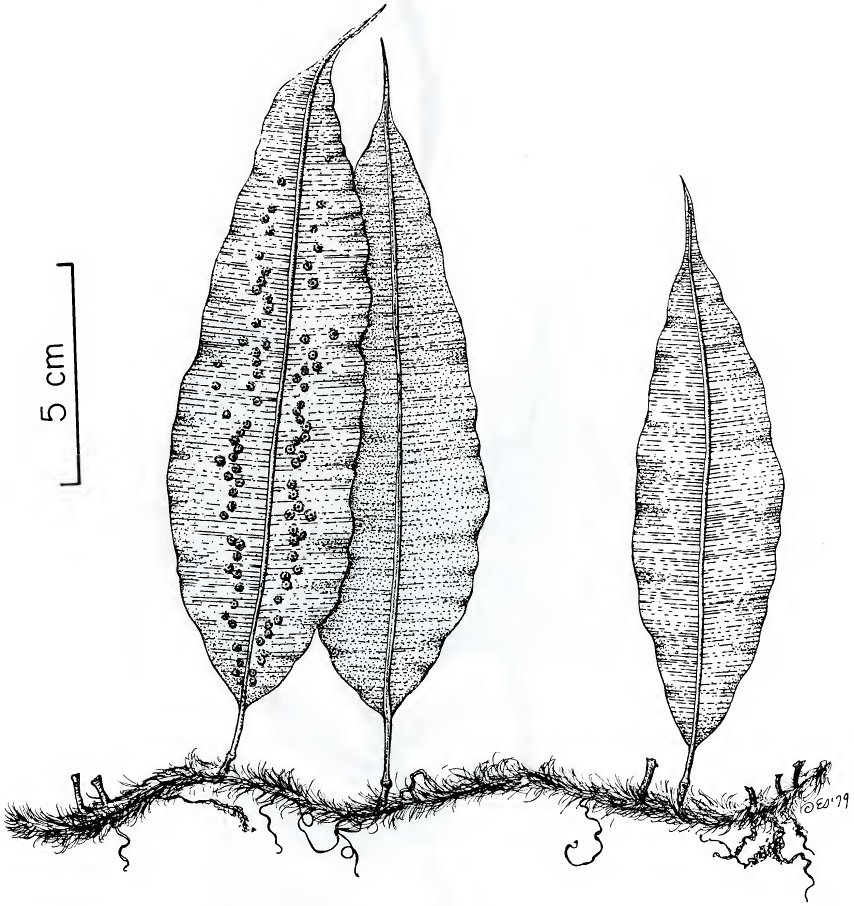

FIGURE 62. *Oleandra articulata* (Swartz) Presl, *23583*, habit.

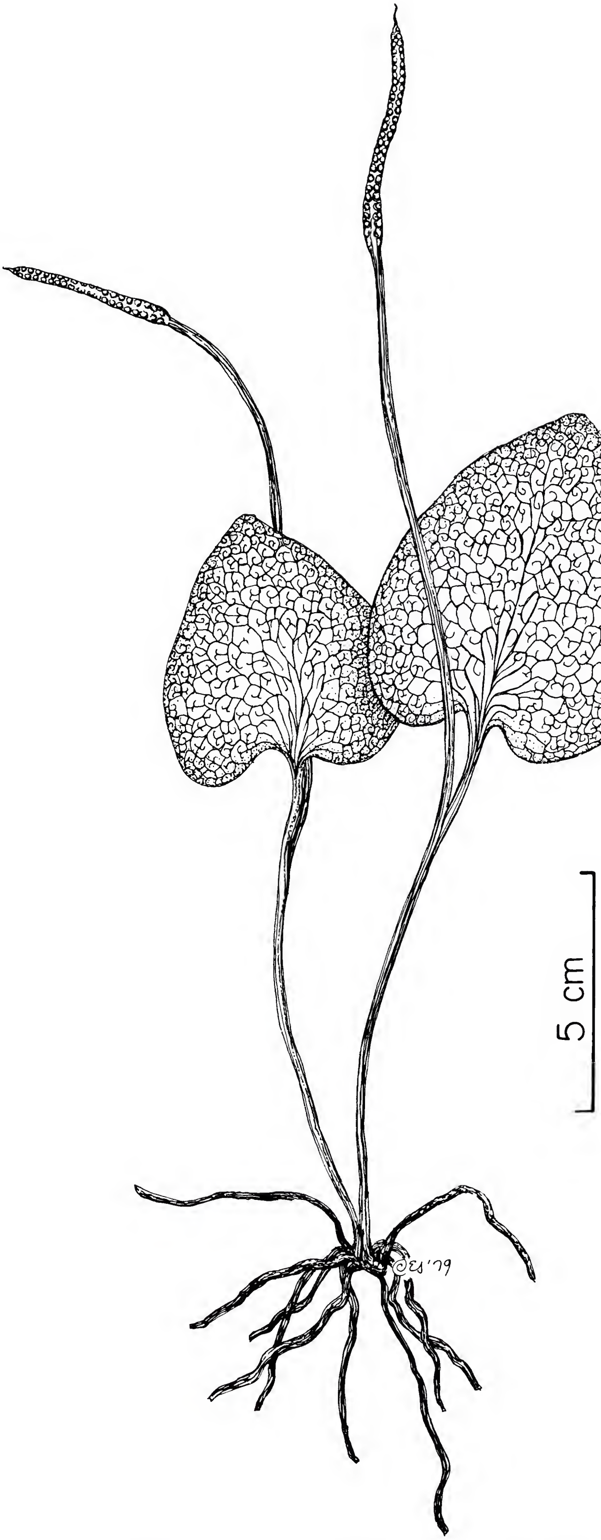

FIGURE 63. *Ophioglossum reticulatum* L., *6407*, habit.

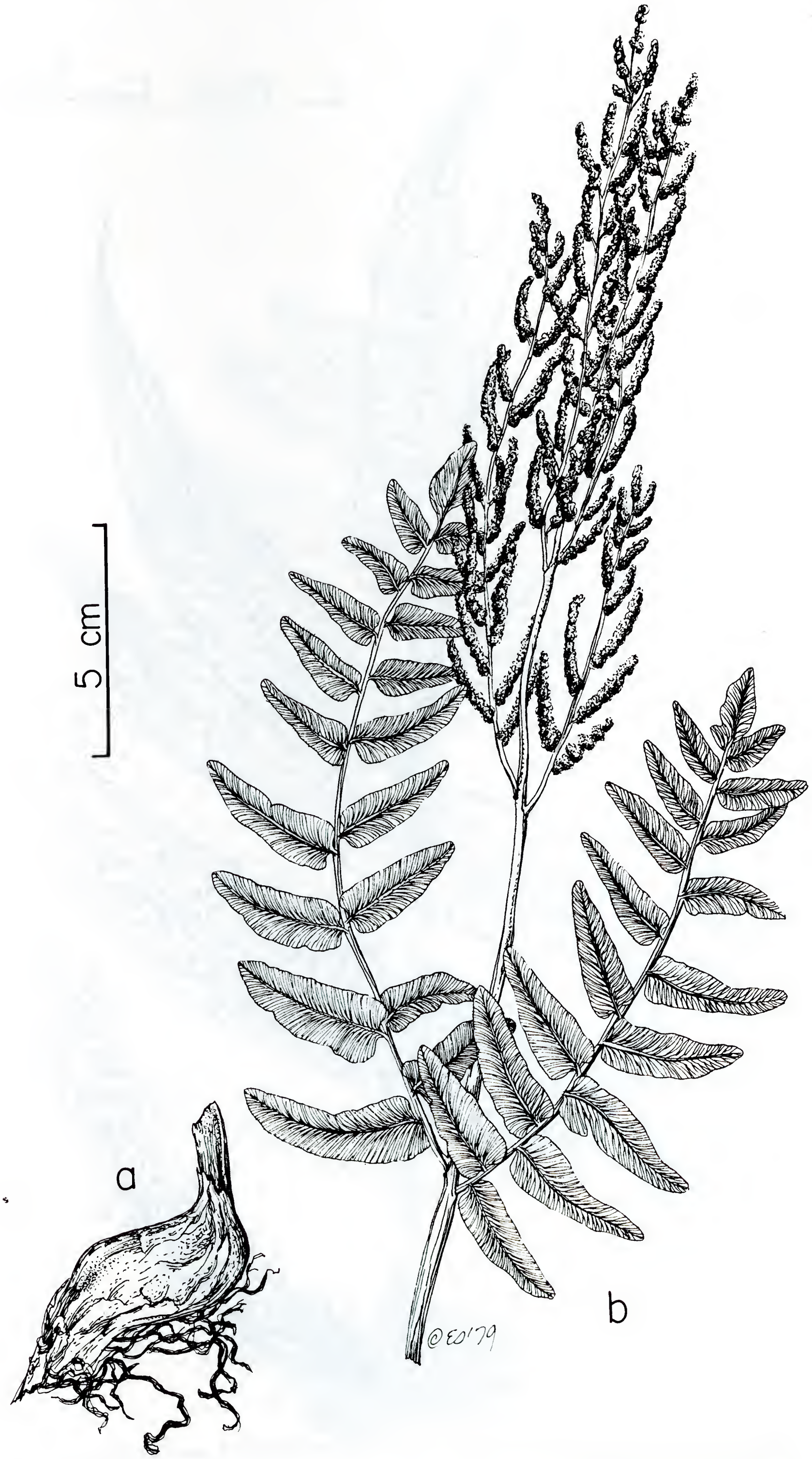

FIGURE 64. *Osmunda regalis* L., *32458*: a, rhizome and stipe base; b, apex of blade.

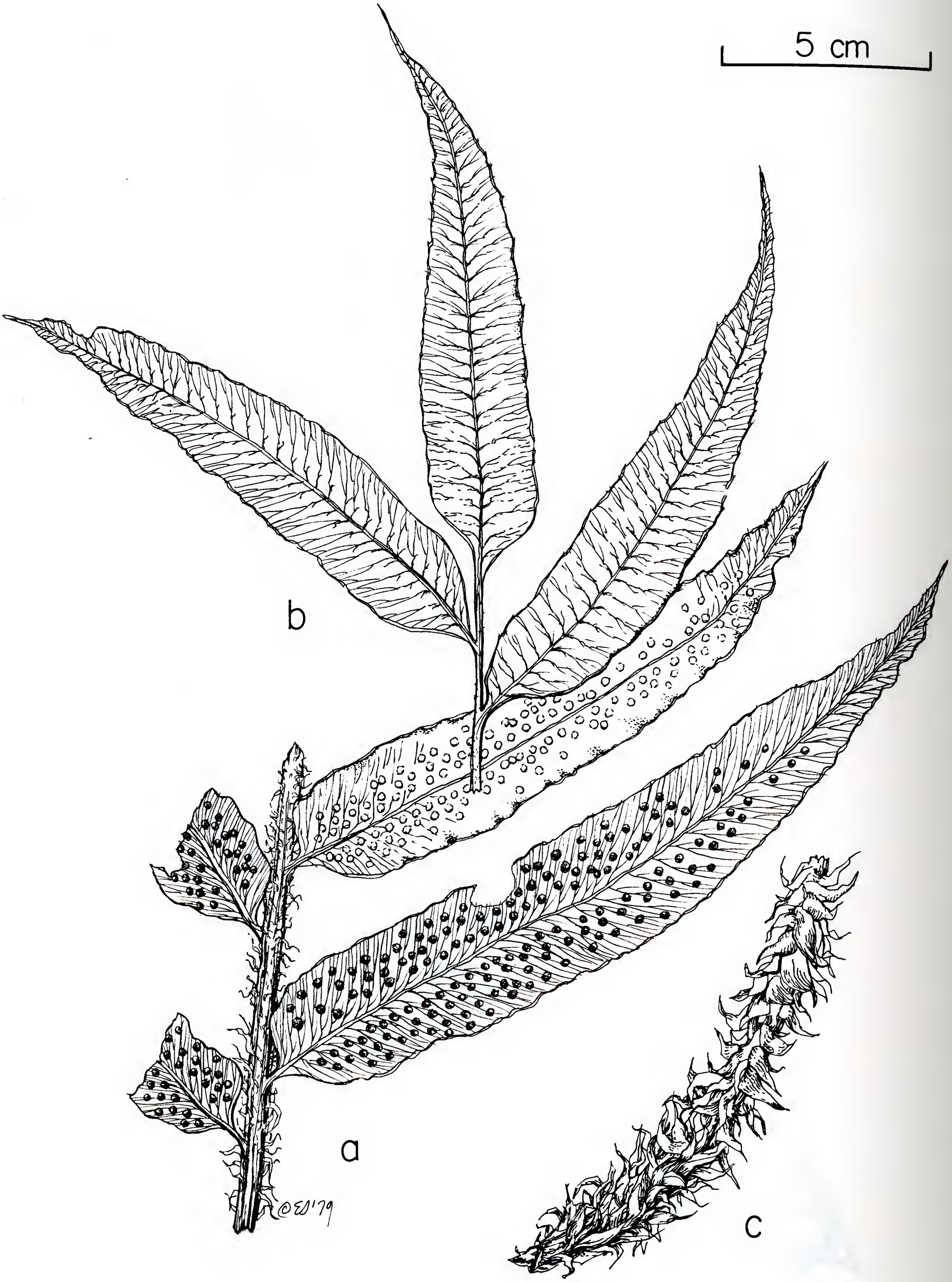

FIGURE 65. *Phanerophlebia macrosora* (Bak.) Underw., *31881*: a, lower pinnae; b, apex of lamina; c, stipe base.

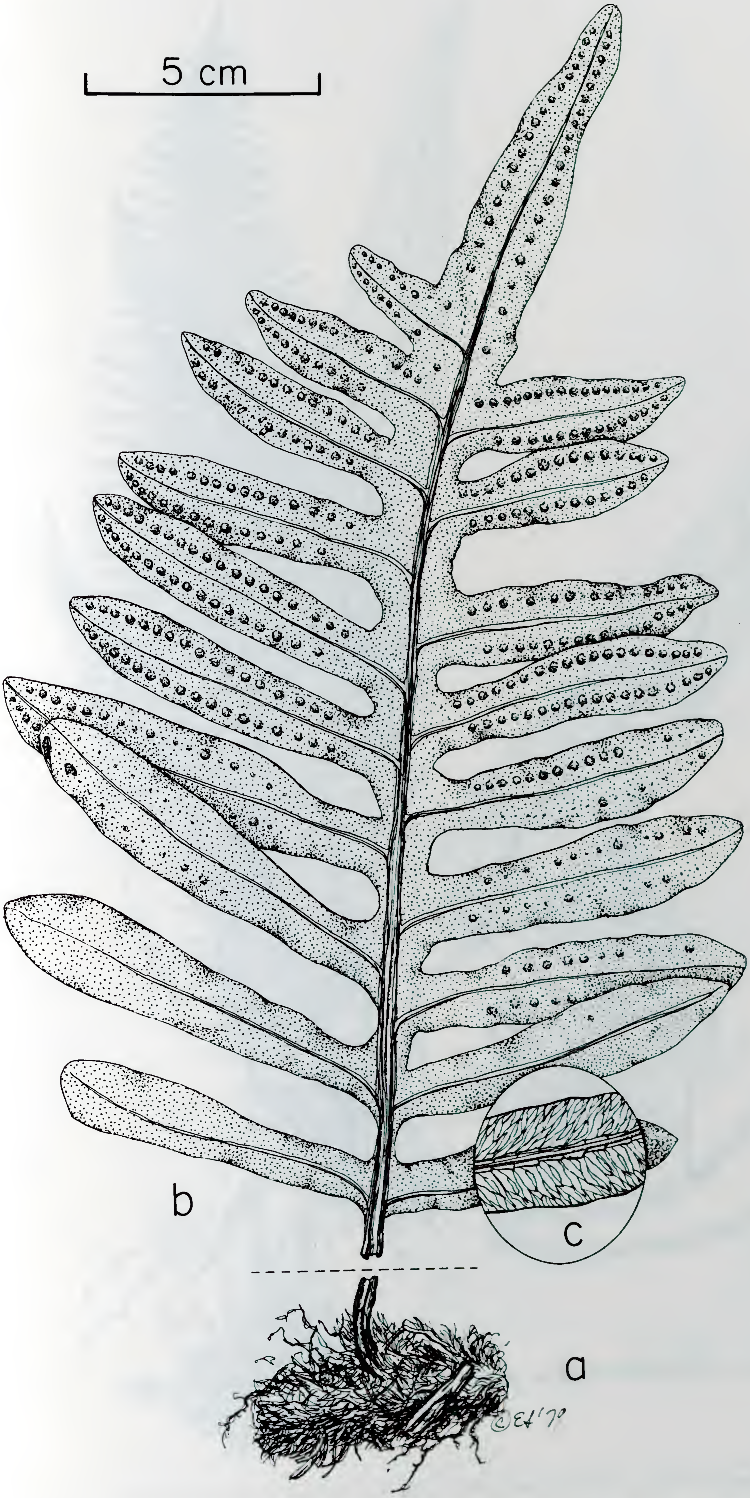

FIGURE 66. *Phlebodium aureum* (L.) J. Smith: a, rhizome and stipe base, *42479*; b, lamina, *28483*; c, venation, *42479*.

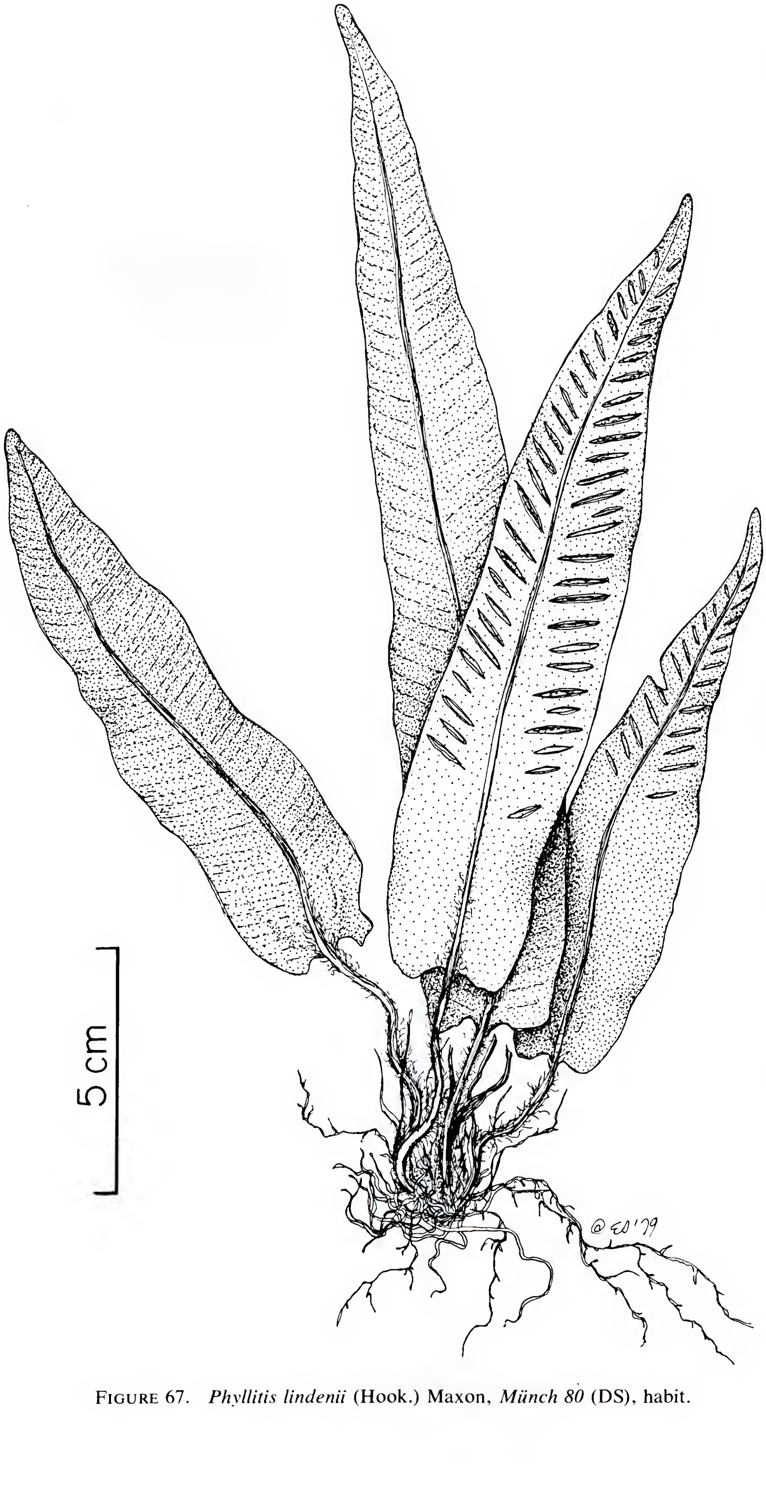

FIGURE 67. *Phyllitis lindenii* (Hook.) Maxon, *Münch 80* (DS), habit.

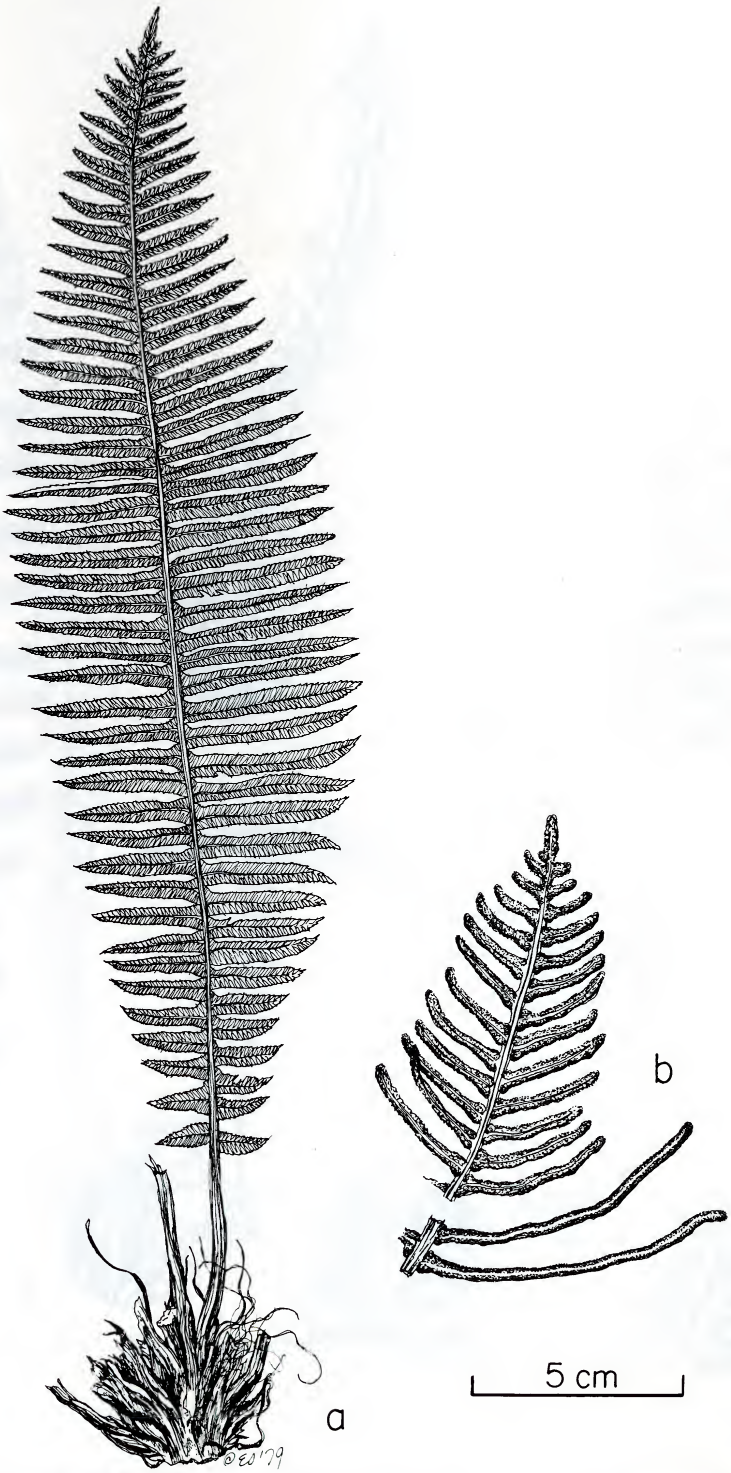

FIGURE 68. *Plagiogyria pectinata* (Liebm.) Lellinger: a, habit, sterile frond, *32034*; b, portion of fertile lamina, *12907*.

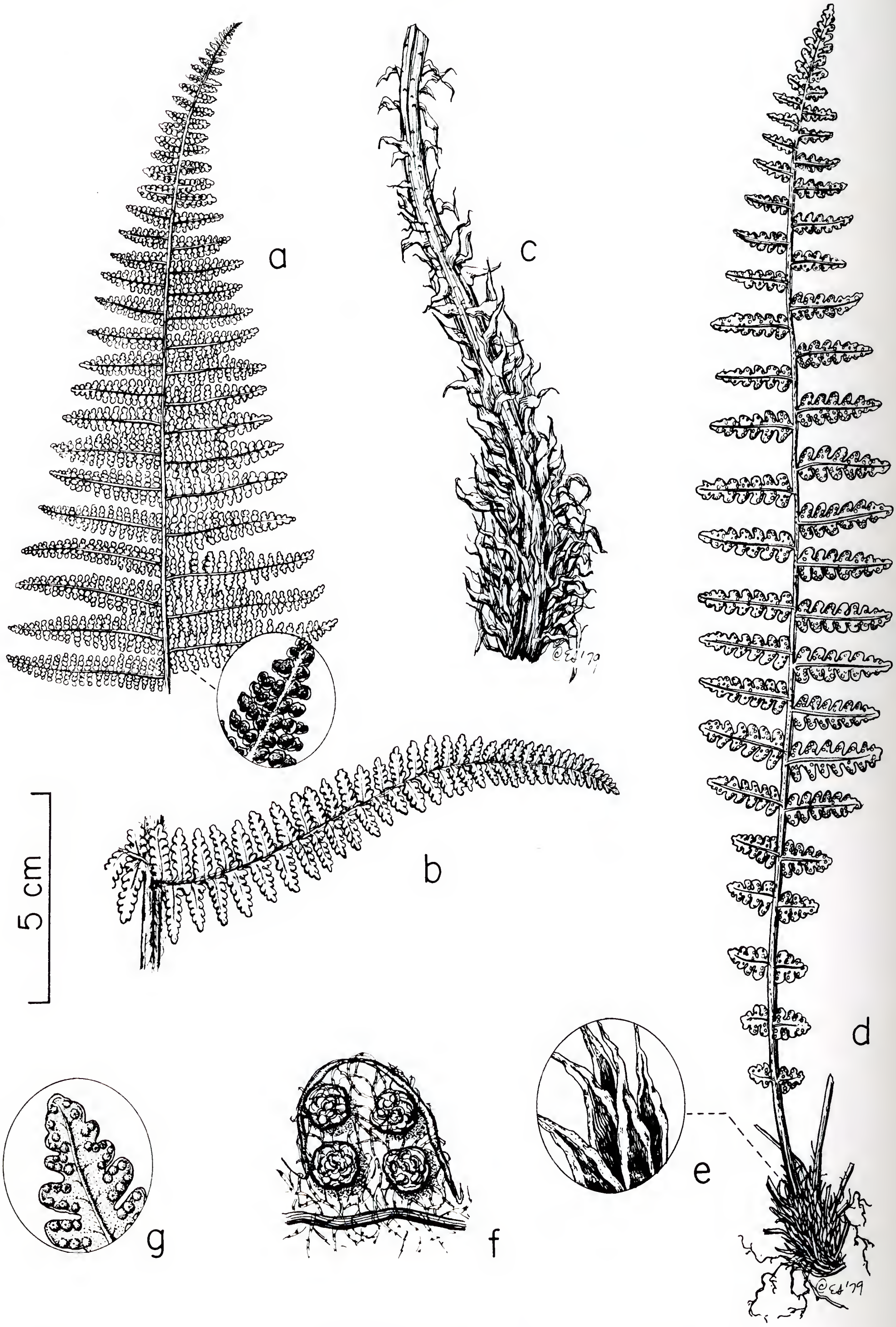

Figure 69. *Plecosorus speciosissimus* (A. Br.) Moore: a, apex of lamina, *8651*; b, lower pinna, *24302*; c, stipe base, *8651*. —*Woodsia mollis* (Kaulf.) J. Smith, *27203*: d, habit; e, rhizome scales; f, sori and indument; g, apex of pinna.

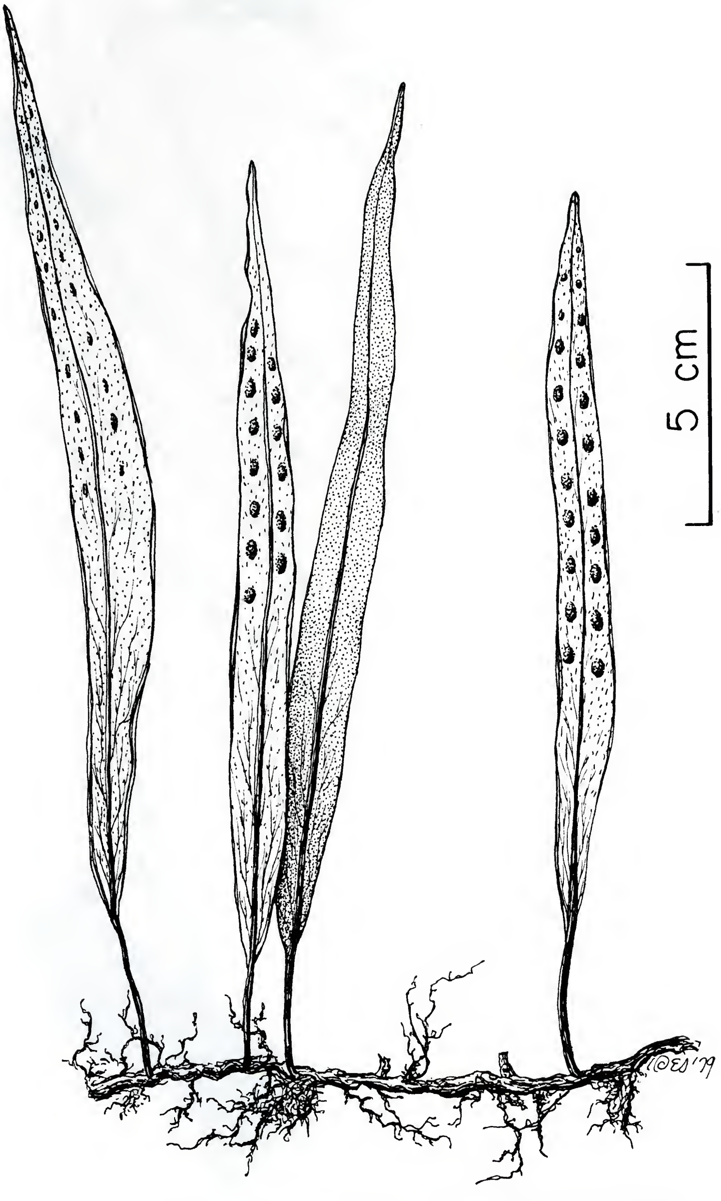

FIGURE 70. *Pleopeltis crassinervata* (Fée) Moore, *21617, 32505*, habit.

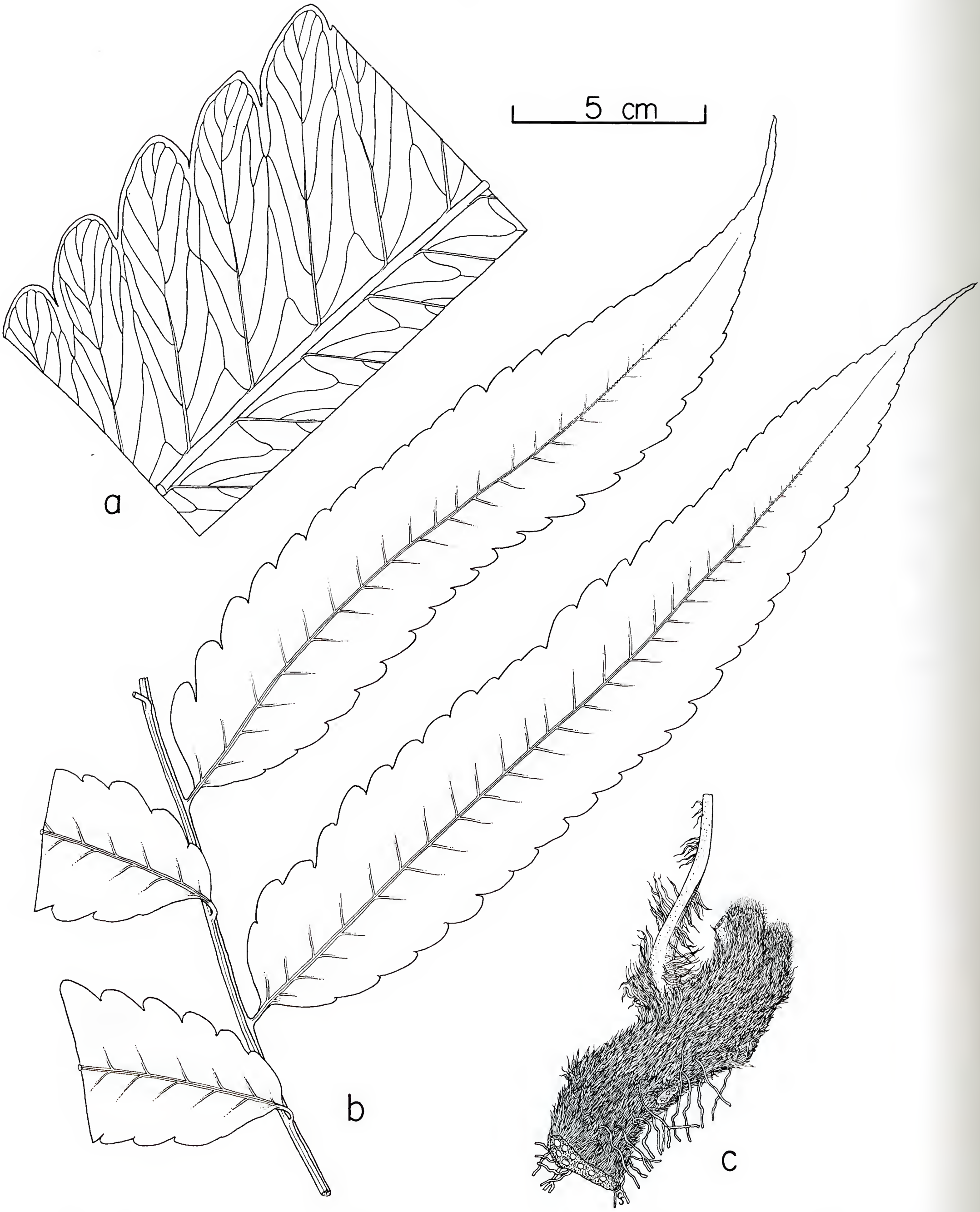

FIGURE 71. *Polybotrya aucuparia* Christ, *21886*: a, venation; b, sterile pinnae; c, rhizome and stipe base.

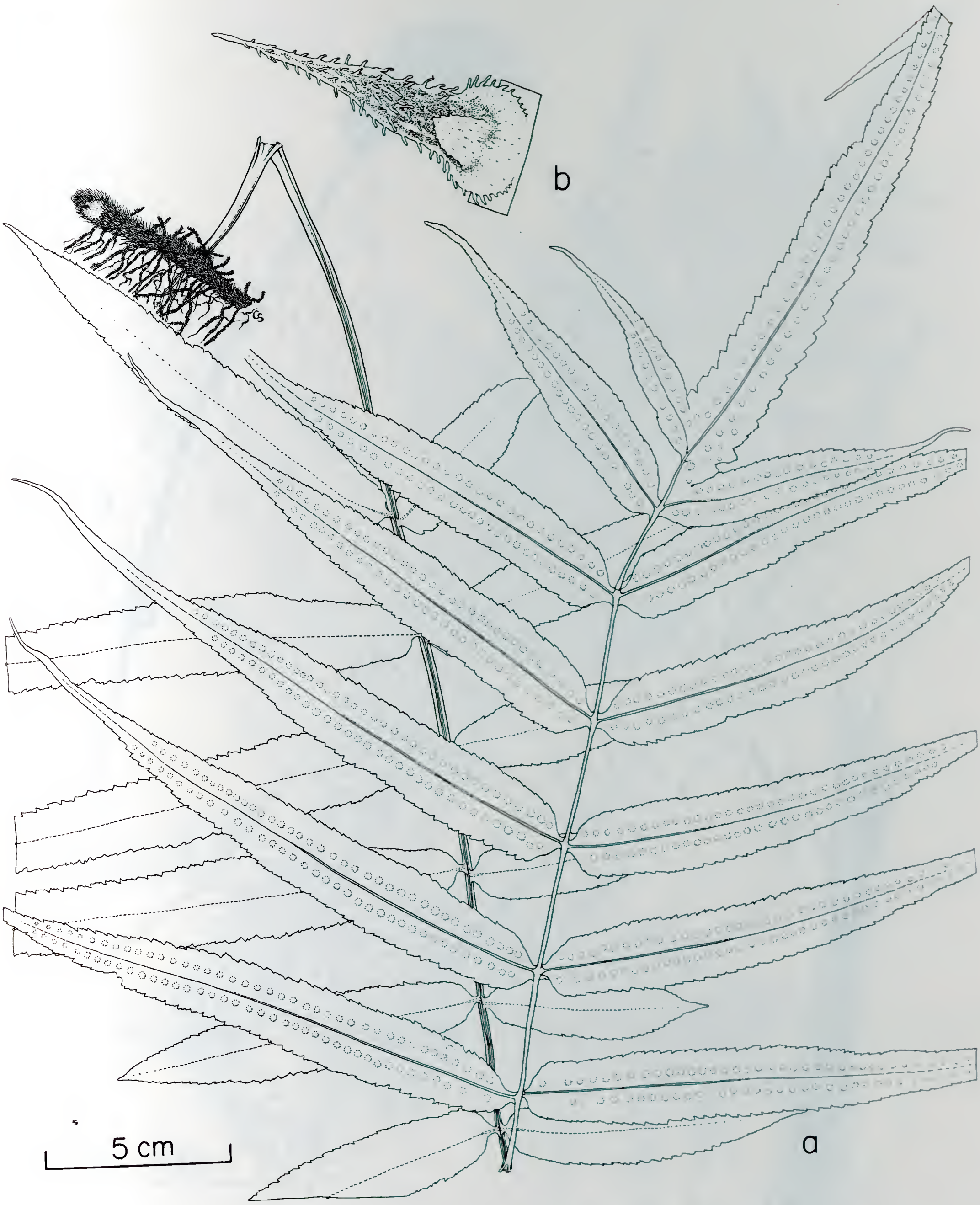

FIGURE 72. *Polypodium echinolepis* Fée, *41965*: a, habit; b, rhizome scale.

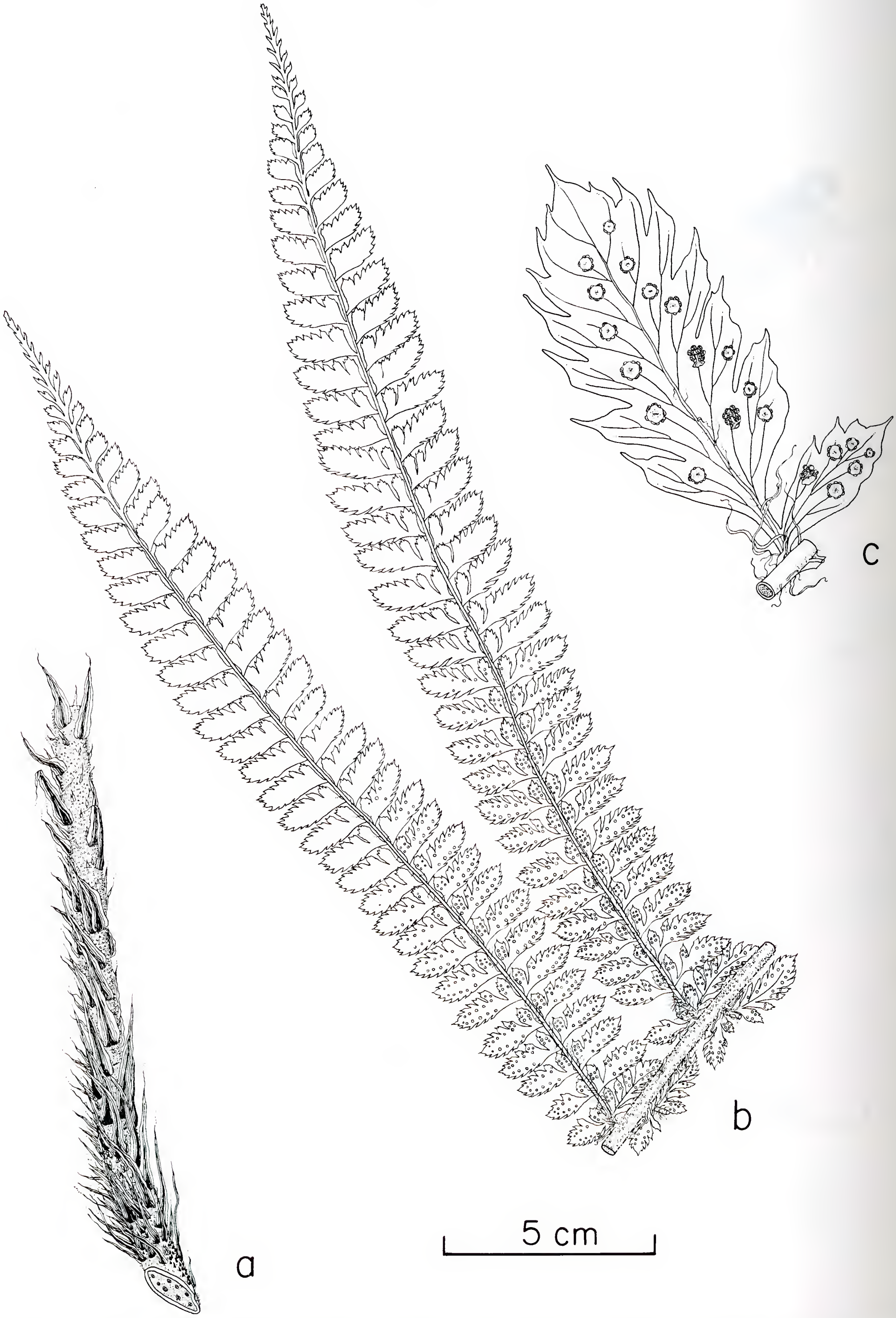

FIGURE 73. *Polystichum hartwegii* (Klotzsch) Hieron., *31234*: a, stipe base; b, middle pinnae; c, pinnule, showing venation and peltate indusia.

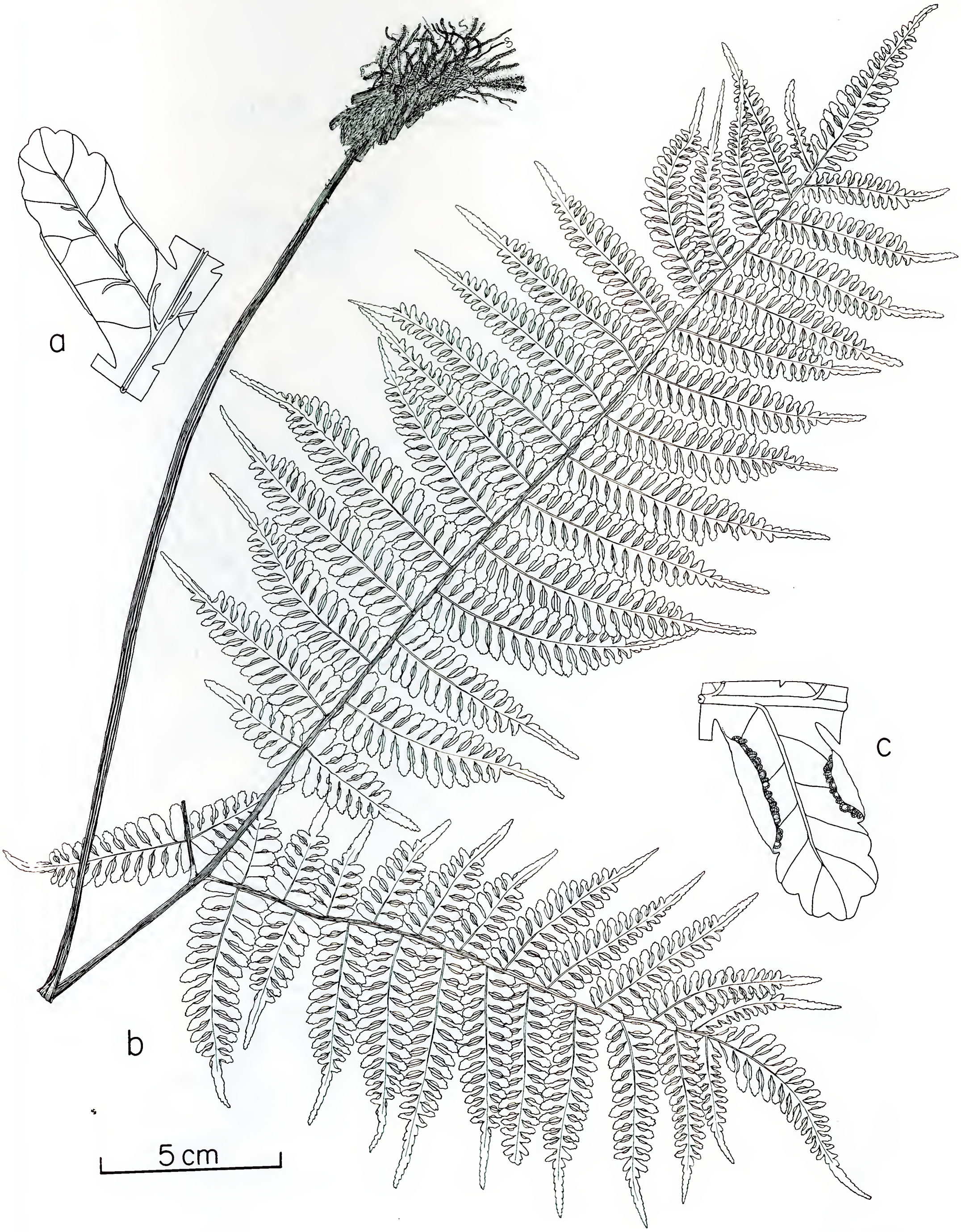

FIGURE 74. *Pteris muricella* Fée, *31322*: a, adaxial surface of ultimate segment; b, habit; c, abaxial surface of ultimate segment.

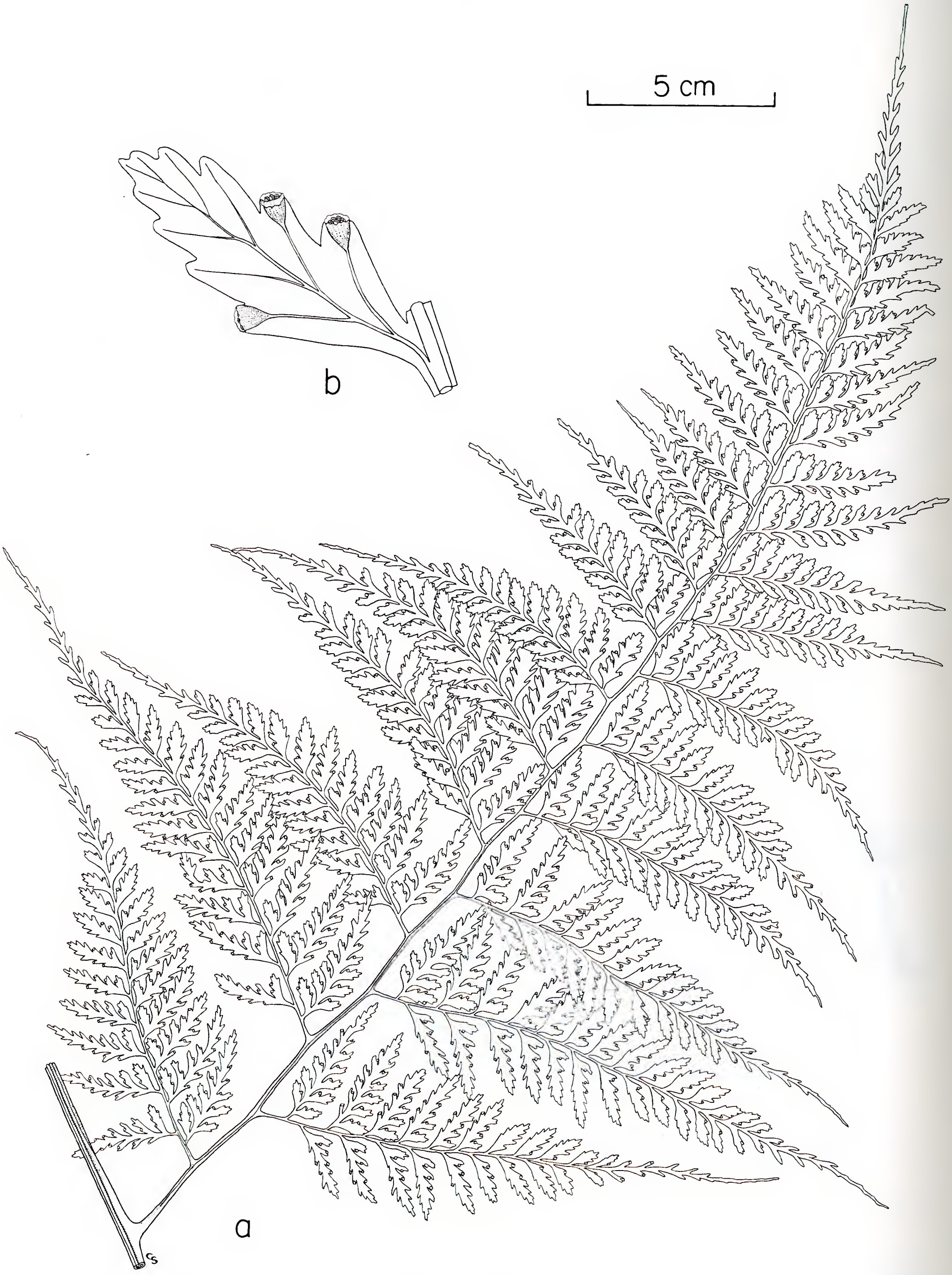

FIGURE 75. *Saccoloma inaequale* (Kunze) Mett., *31996*: a, pinna; b, ultimate segment, showing sori.

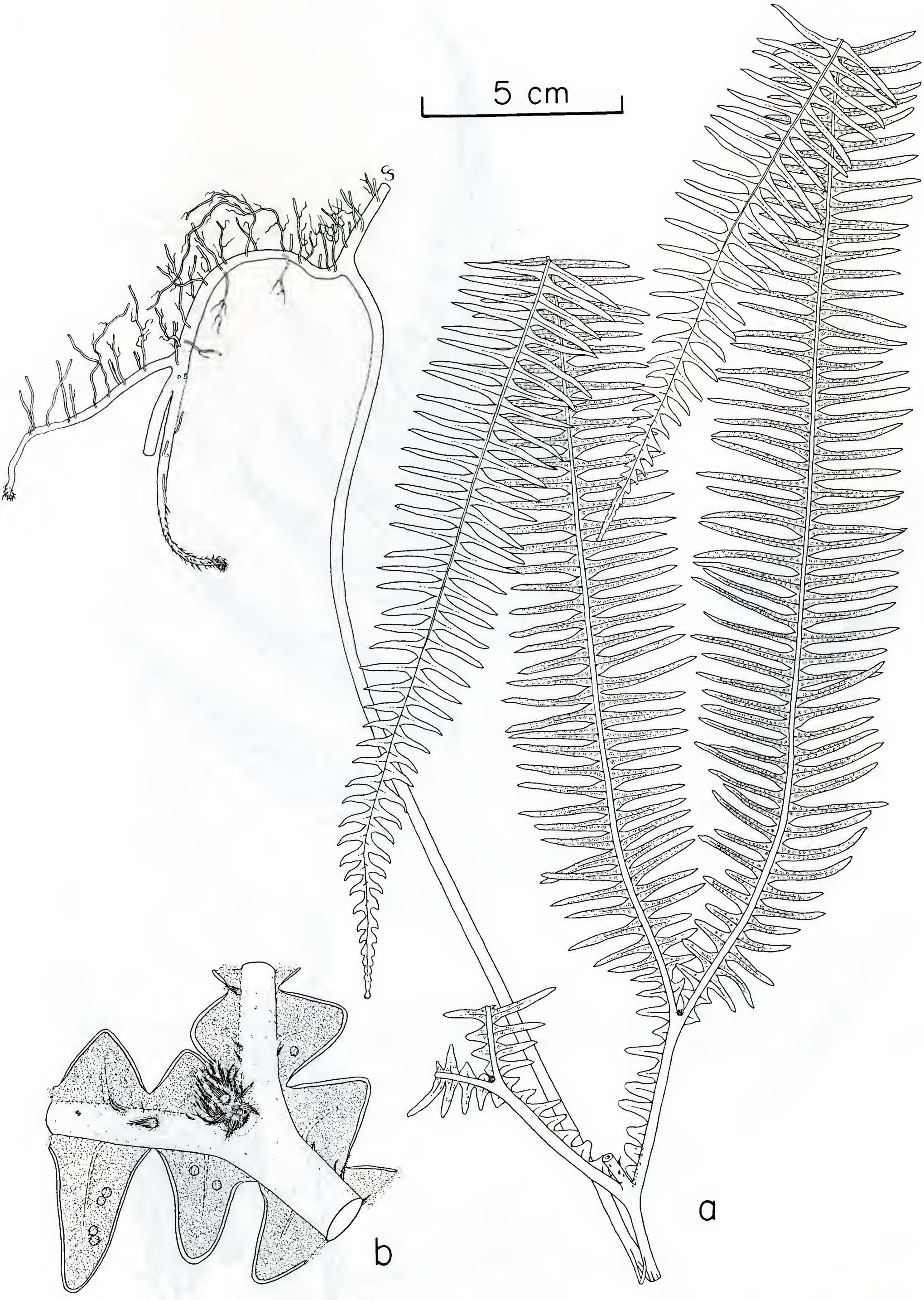

FIGURE 76. *Sticherus brevipubis* (Christ) A. R. Smith, *41801*: a, habit; b, abortive apex at dichotomy.

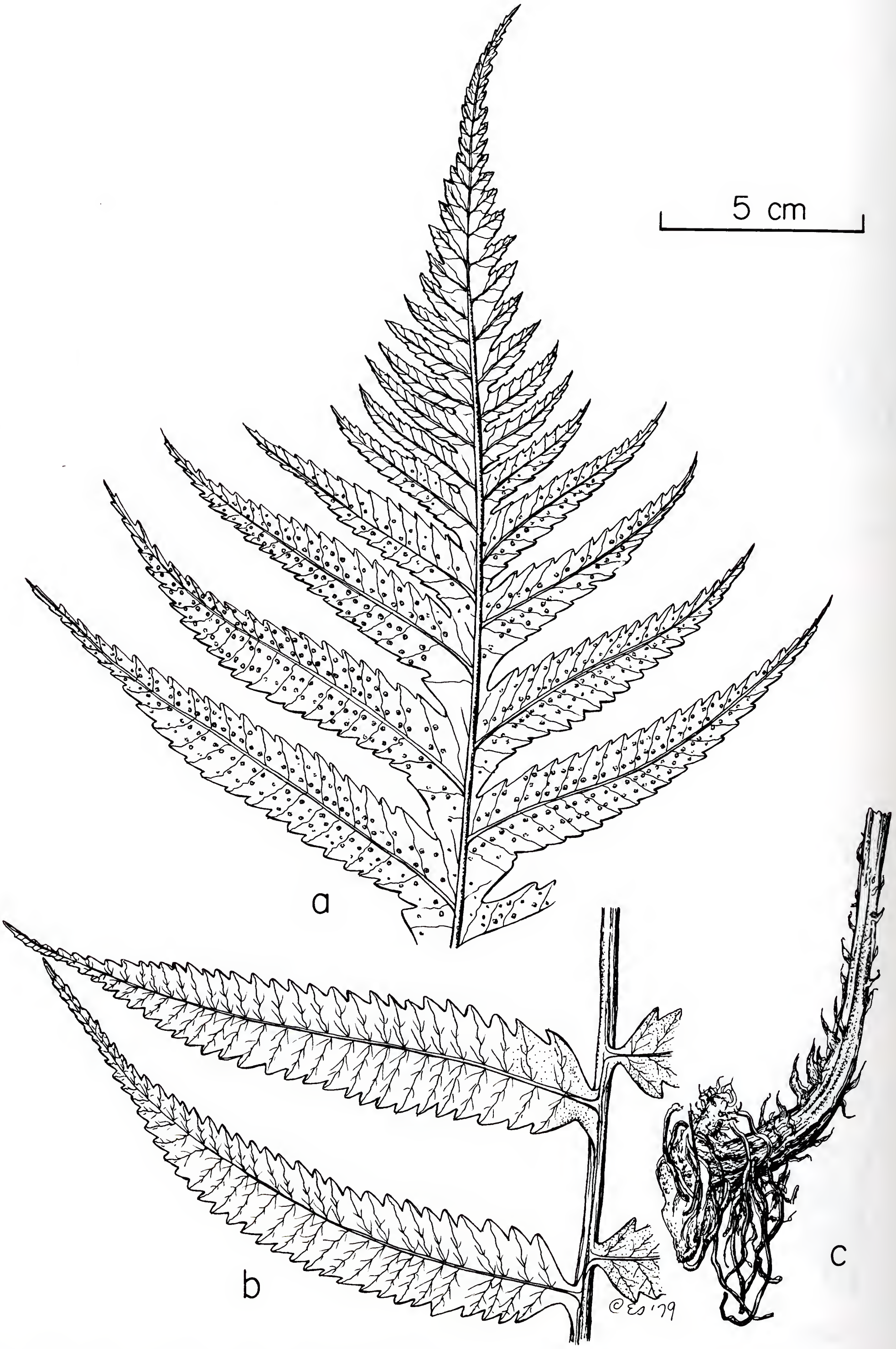

FIGURE 77. *Stigmatopteris longicaudata* (Liebm.) C. Chr., *32672*: a, apex of lamina; b, middle pinnae; c, stipe base.

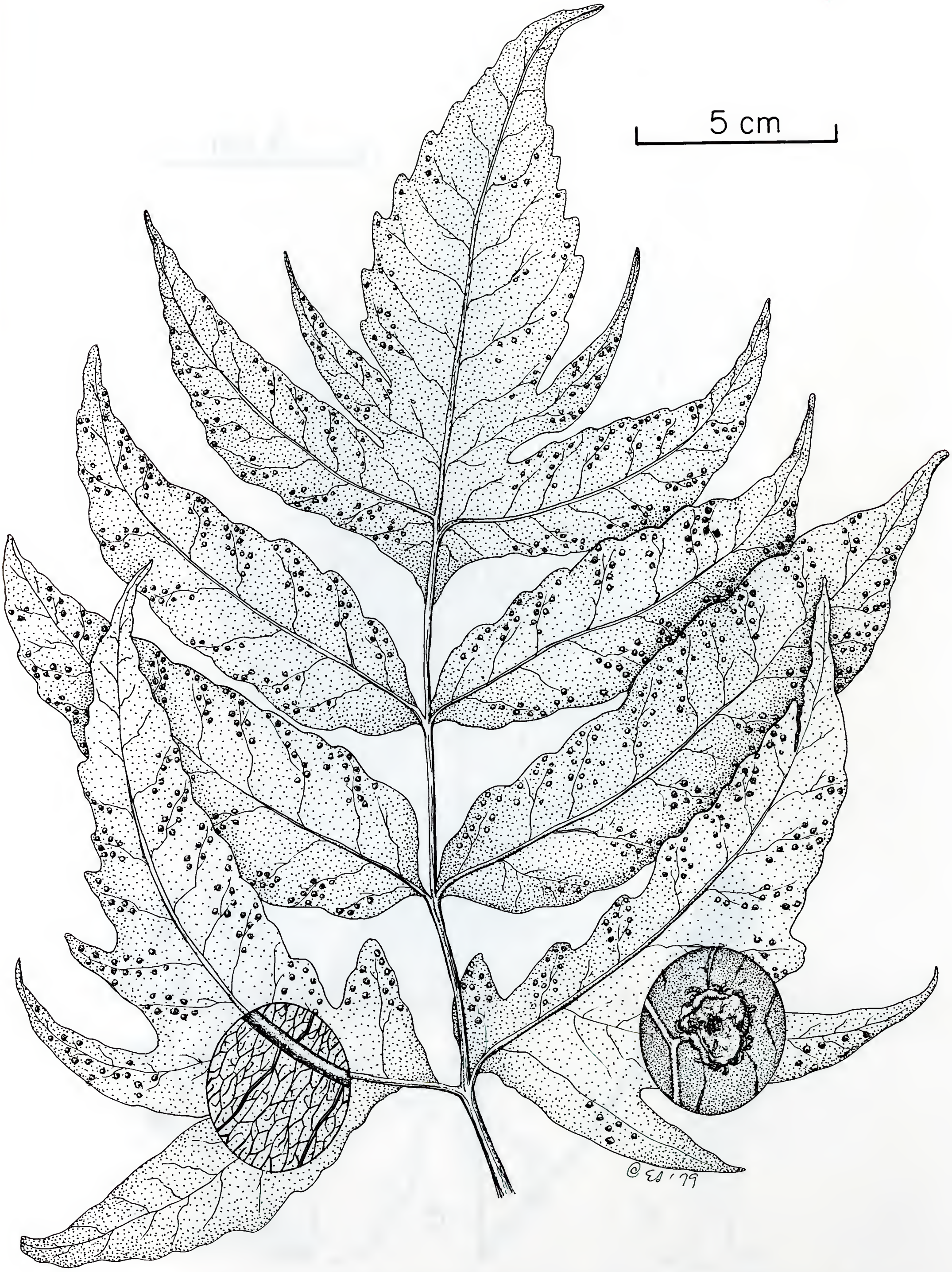

FIGURE 78. *Tectaria transiens* (Morton) A. R. Smith, *26054, 32953,* lamina with details of venation and sorus.

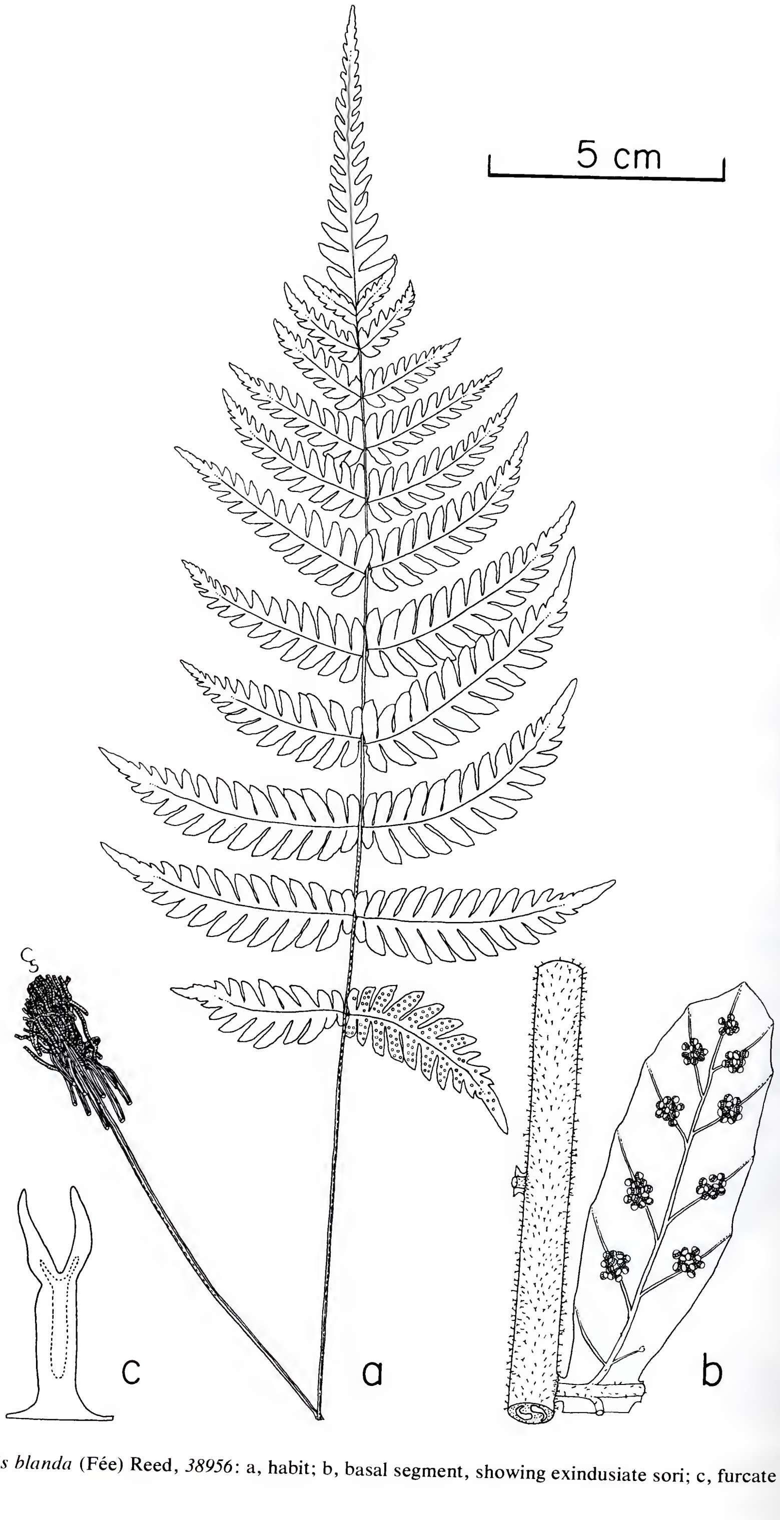

FIGURE 79. *Thelypteris blanda* (Fée) Reed, *38956*: a, habit; b, basal segment, showing exindusiate sori; c, furcate hair from rachis.

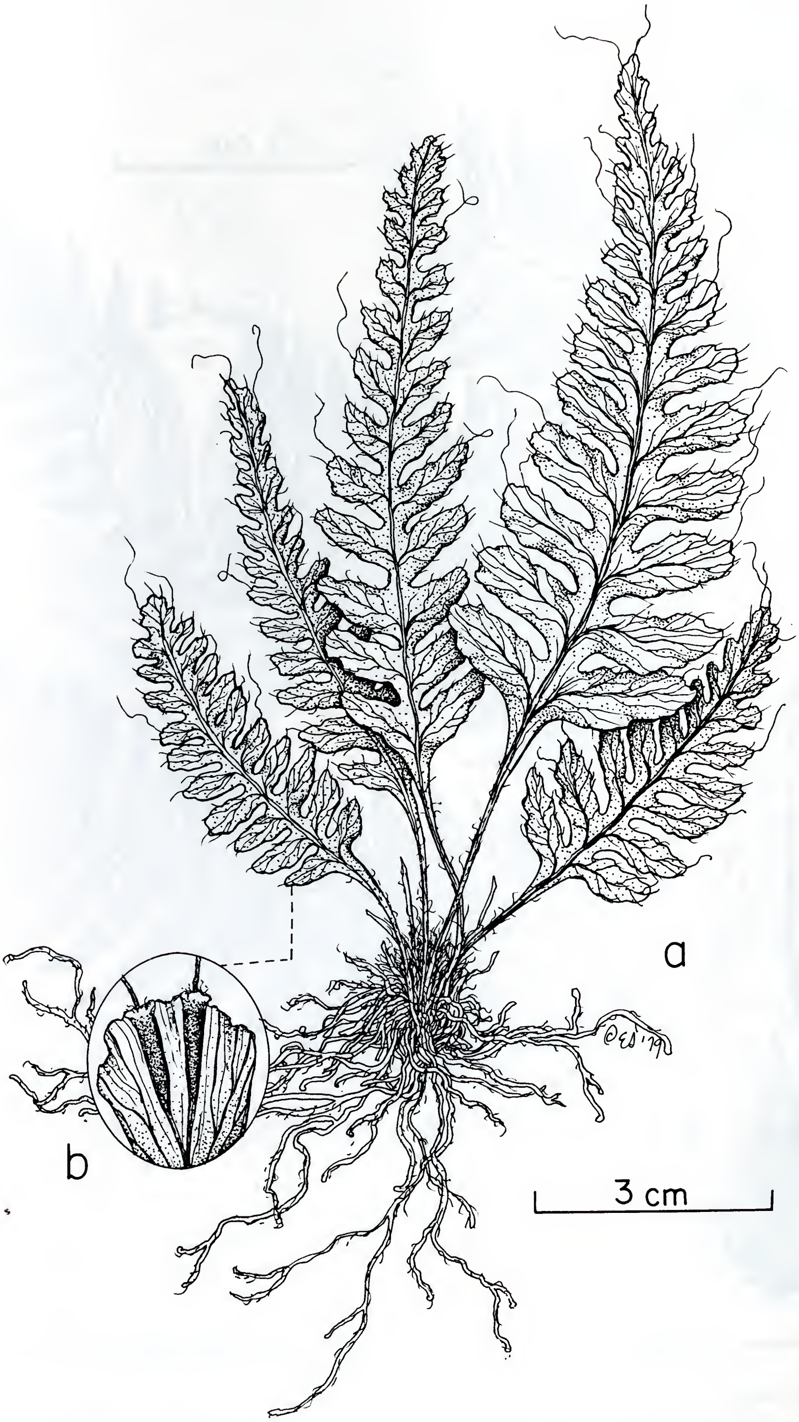

FIGURE 80. *Trichomanes* cf. *galeottii* Fourn., *21893*: a, habit; b, segment with sori.

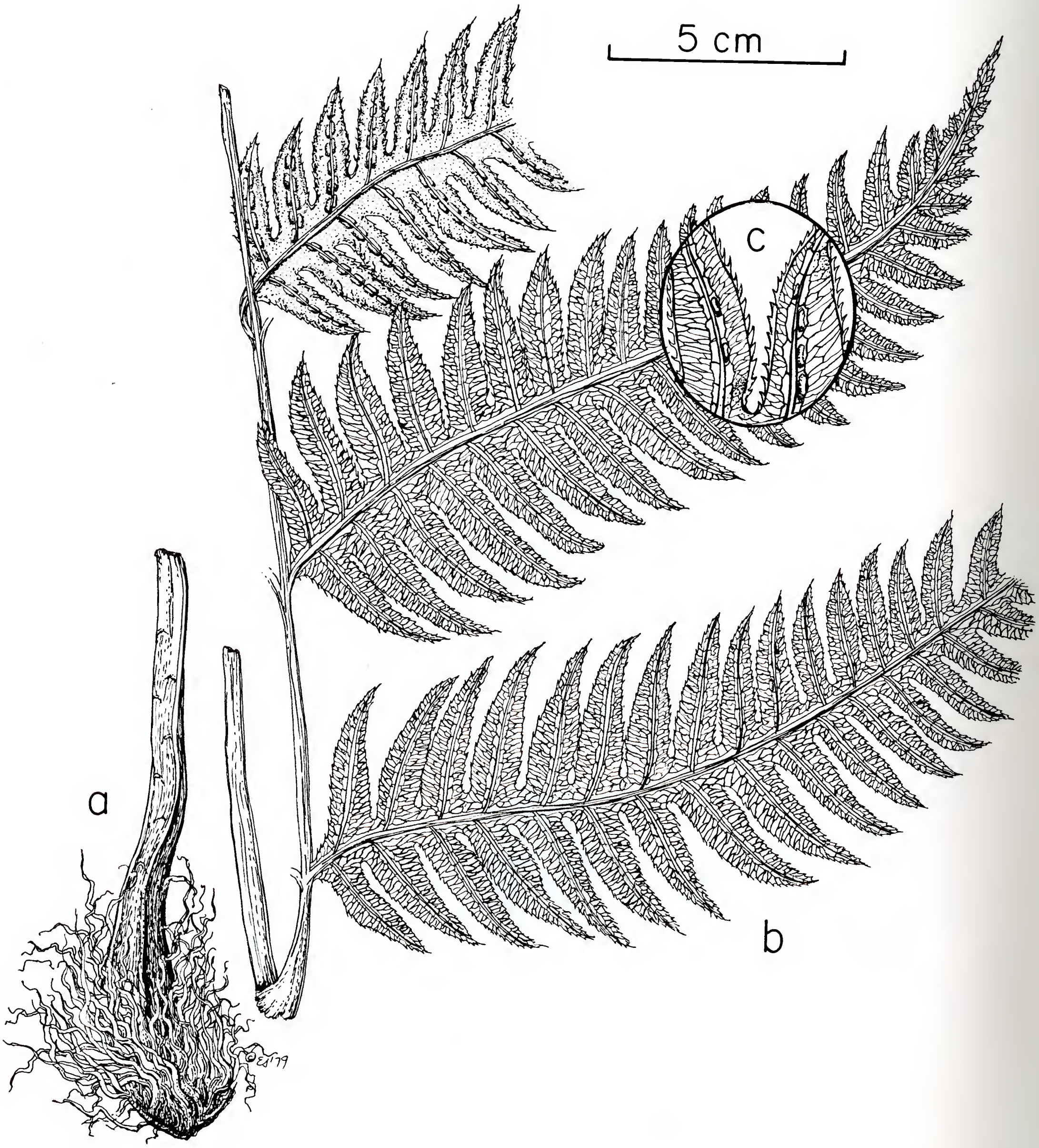

FIGURE 81. *Woodwardia spinulosa* Mart. & Gal.: a, stipe base, *6657*; b, lower pinnae, *6657, 27214*; c, venation.

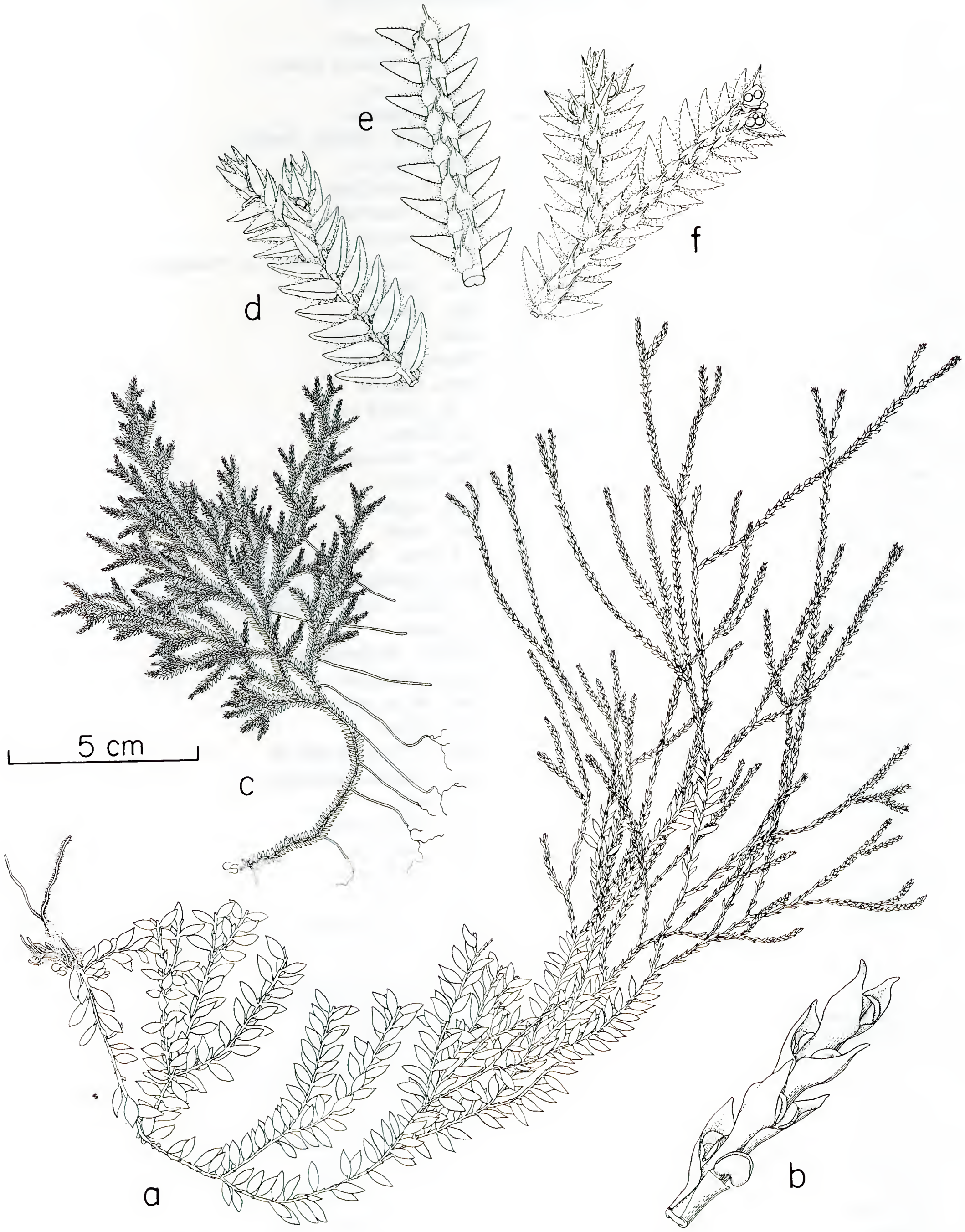

Figure 82. *Lycopodium skutchii* Maxon, *23232*: a, habit; b, fertile branchlets, showing sporangia. —*Selaginella huehuetenangensis* Hieron., *33161*: c, habit; d, lower surface; e, proximal portion of stem; f, upper surface.

APPENDIX–ABBREVIATIONS*

aff., related to
Afr., Africa
Aguasc., Aguascalientes
Ala., Alabama
Alas., Alaska
Am., America
Antill., Antilles
Arg., Argentina
Ariz., Arizona
Ark., Arkansas
Atl., Atlantic
Austral., Australia
Bah. Is., Bahama Islands
Baja C.N., Baja California Norte
Baja C.S., Baja California Sur
B.C., British Columbia
Bel., Belize [or Belice; formerly Br. Honduras]
Berm., Bermuda
Bol., Bolivia
Braz., Brazil
Br. Gui., British Guiana
C.A., Central America
ca., circa
Calif., California
Camp., Campeche
Can., Canada
Carib., Caribbean
cen., central
cf., confer (compare)
Chih., Chihuahua
Chis., Chiapas
cm, centimeter
Cma., Colima
Co., county
Coah., Coahuila
Col., Colombia
Colo., Colorado
comb., combination
C.R., Costa Rica
cult., cultivated
Dept., Departamento
D.F., Distrito Federal
Dgo., Durango
diam., diameter
Dist., Distrito
E, east, eastern
Ecu., Ecuador
Edo., Estado
elev., elevation
Eur., Europe
Euras., Eurasia
exsicc., exsiccata
f., filius, forma
Fla., Florida
fragm., fragment
Fr. Gui., French Guiana
Ga., Georgia
Gal., Galápagos
Gr. Antill., Greater Antilles
Gro., Guerrero
Gto., Guanajuato
Guat., Guatemala
Gui., Guianas
Guy., Guyana [formerly Br. Guiana]
Haw., Hawaii
Hgo., Hidalgo
Hisp., Hispaniola
Hond., Honduras
hwy., highway
I., Is., island (—s)
Ill., Illinois
illegit., illegitimate
Jal., Jalisco
Jam., Jamaica
Jap., Japan
J. Fernán., Juan Fernández
La., Louisiana
L. Antill., Lesser Antilles
m, meter
Madag., Madagascar
Males., Malesia
Md., Maryland
Me., Maine
Méx., México (state of)
Mex., Mexico (country)
mi., miles
Mich., Michoacán
Mlos., Morelos
mm, millimeter
Mo., Missouri
mt., mts., mountain (—s)
munic., municipio
N, north, northern
N.A., North America(n)
Nay., Nayarit
N.C., North Carolina
NE, northeast, northeastern
Nev., Nevada
Nic., Nicaragua
N. Gui., New Guinea
N.L., Nuevo León
N.M., New Mexico
no., nos., number (—s)
nom. nov., nomen novum (new name)
nom. nud., nomen nudum (naked name)
nom. superfl., superfluous name
NW, northwest, northwestern
N.Z., New Zealand

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[*] Not always the same as for literature references, which follow B-P-H (e.g., Venez. cf. Ven., Amer. cf. Am.).

Oax., Oaxaca
Okla., Oklahoma
O.W., Old World
Pac., Pacific
Pan., Panama
Parag., Paraguay
Polyn., Polynesia
P.R., Puerto Rico
pt., part
Pue., Puebla
Qro., Queretaro
Q. Roo, Quintana Roo
Que., Quebec
R., river or río
rd., road
s, south, southern
S.A., South America
S. Afr., South Africa
Salv., El Salvador
S.C., South Carolina
S.D., South Dakota
SE, southeast, southeastern
sect., section
Sin., Sinaloa
s.l., sensu lato, in the broad sense
S.L.P., San Luis Potosí
Son., Sonora
sp., species (singular)
spp., species (plural)
s.s., sensu stricto, in the narrow sense
ssp., subspecies (singular)
sspp., subspecies (plural)
subg., subgenus
subtrop., subtropical
Sur., Surinam
sw, southwest, southwestern
syn., synonym
Tab., Tabasco
Tam., Tamaulipas
Tex., Texas
Tlax., Tlaxcala
Tob., Tobago
Trin., Trinidad
trop., tropical
U.S., United States
Urug., Uruguay
Va., Virginia
var., variety
Ven., Venezuela
Ver., Veracruz
vol., volcán
Vt., Vermont
w, west, western
Wash., Washington
W.I., West Indies
Wis., Wisconsin
Yuc., Yucatán
Zac., Zacatecas

ADDENDUM

Two recent publications make significant contributions to our knowledge of Central American pteridophytes. The first of these is Ralph Seiler's "Una guía taxonómica para helechos de El Salvador," pp. 1–58 (1980), published by the Ministerio de Educación, San Salvador. This guide contains a list of the pteridophytes known from El Salvador and is based on literature citations and collections in the Herbario de la Universidad Nacional and the Herbario del Museo de Historia Natural de El Salvador. This checklist extends the range of many species and fills in distributional gaps of widespread Neotropical pteridophytes.

The second work, Robert Stolze's "Ferns and fern allies of Guatemala, Part II, Polypodiaceae" [Fieldiana, Bot. (n.s.) 6:1–522, i–ix, figs. 1–80. 1981], is a model of floristic and pteridological excellence. It contains keys, synonymies, descriptions, notes, and illustrations. Differences in circumscription of certain taxa in Guatemala vs. Chiapas will inevitably attract our attention. I view this in a positive manner: these differences serve to underline areas that need additional investigation. Moreover, the far more numerous agreements in circumscription of taxa renew our confidence in our abilities to recognize discrete taxonomic units.

An older work also deserves some additional comments. Liebmann's species of ferns were published first in Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Afd. (5) 1:151, 1849, and later as a separate (Mexicos Bregner . . .); references to Liebmann taxa in other works are often cited by giving the page number in the separate (seors. no.), which can be obtained by subtracting 152 from the page number in the original work (given herein). Liebmann names present difficult problems in typification. Most sheets in Copenhagen have both a "Liebm. Pl. Mex." number and also a "Flora Mexicana" number. These are not to be taken as true collection numbers, and Liebmann did not cite them in his publication. In general, he listed localities (often several) for a given species. Many Liebmann collections, including types, are in a separate folio collection at Cophenhagen and often have not been seen by monographers in their studies. Therefore, I have thought it worthwhile to make as complete an account as possible of the type material of Liebmann names and have listed localities as well as Fl. Mex. and Liebm. Pl. Mex. numbers. This compilation was made during a visit to the Botanical Museum and Herbarium in Copenhagen in April 1976.

Several other recent papers, listed at the end of this Addendum, add further to the distributional, nomenclatural, and classificatory knowledge of Chiapas ferns. The following notes are arranged alphabetically by genus and species. These taxa are indicated in the Index by "A"; page numbers refer to their primary place of reference in text.

Acrostichum aureum L. — p. 16
Also Edo. Tabasco, e.g., *Cowan 3193* (Cowan, 1980); information on the reproductive biology of this species has recently been published by Lloyd (1980).

Adiantopsis radiata (L.) Fée — p. 17
Also Edo. Tabasco, e.g., *Matuda 3330* (Cowan, 1980).

Adiantum dolosum Kunze — p. 21
Also Edo. Veracruz (Riba & Pérez-García, 1979).

Adiantum fructuosum Spreng. — p. 22
Also Edo. Veracruz (Riba & Pérez-García, 1979).

Adiantum petiolatum Desv. — p. 23
Also Edo. Veracruz (Riba & Pérez-García, 1979).

Adiantum tenerum Swartz — p. 25
Also Edo. Tabasco: *Cowan 3163* (Cowan, 1980).

Asplenium abscissum Willd. — p. 39
Also Edo. Tabasco: *Cowan 3157* (Cowan, 1980).

Asplenium auritum Swartz — p. 40
Also Edo. Tabasco: *Cowan et al. 2970* (Cowan, 1980).

Asplenium cristatum Lam. — p. 42
Also Edo. Tabasco, e.g., *Cowan et al. 2965* (Cowan, 1980).

Asplenium formosum Willd. — p. 45
Also Edo. Tabasco, e.g., *Matuda 3331* (Cowan, 1980).

Blechnum occidentale L. — p. 59
Also Edo. Tabasco, e.g., *Cowan 3068* (Cowan, 1980).

Blechnum polypodioides Raddi — p. 60
The original illustrations of both *B. polypodioides* (Pl. Bras. 1:pl. 60, fig. 2. 1825) and *B. unilaterale* Swartz, treated by Murillo as synonyms of *B. asplenioides* Swartz, appear to me to be more like her concept of *B. confluens* Schlecht. & Cham. (type from Mexico). *Blechnum asplenioides* is primarily a South American species, while *B. confluens* (sensu Murillo) is more widespread, occurring in both North and South America. I have seen no material of "typical" *B. asplenioides* from Mexico, Central America, or the Antilles (even though Murillo stated its range as Central America and listed a synonym, *B. angustifrons* Fée, type from Mexico. If *B. confluens* is treated as conspecific with *B. unilaterale* and *B. polypodioides,* the correct name to be applied is *B. polypodioides* Raddi, as I have done.

Campyloneurum angustifolium (Swartz) Fée — p. 67
Also Edo. Tabasco: *Cowan 2908* (Cowan, 1980).

Ceratopteris pteridoides (Hook.) Hieron. — p. 69
Also Edo. Tabasco, e.g., *Cowan 2804* (Cowan, 1980).

Cheilanthes Swartz — p. 69

Recent works by Reeves (1980a) and Tryon and Tryon (1981) indicate that a more natural classification of the cheilanthoid ferns can be obtained by placing in *Cheilanthes* several species previously placed in other genera. If their views are accepted, the following four Chiapas species will be added to *Cheilanthes* (accepted name used in this flora follows in brackets):

Cheilanthes bonariensis (Willd.) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5:15. 1953 [=*Notholaena aurea* (Poir.) Desv.].

Cheilanthes brachypus (Kunze) Kunze [≡*Notholaena brachypus* (Kunze) J. Smith].

Cheilanthes concolor (Langsd. & Fisch.) R. & A. Tryon, Rhodora 83:133. 1981 [≡*Doryopteris concolor* (Langsd. & Fisch.) Kuhn].

Cheilanthes sinuata (Sw.) Domin [≡*Notholaena sinuata* (Lag. ex Sw.) Kaulf.].

Cheilanthes skinneri (Hook.) R. & A. Tryon, Rhodora 83:133. 1981 [≡*Pellaea skinneri* Hook.]. Presumably, *Pellaea seemannii* Hook. also should be placed in *Cheilanthes,* but cannot be transferred directly because of the existence of a prior and different *C. seemannii* Hook.

Cheilanthes jamaicensis Maxon — p. 72

Reeves (in litt.) indicates that he regards both *C. jamaicensis* and *C. tomentosa* Link as occurring in Chiapas. He identifies *Münch 45* (DS) as *C. jamaicensis* and *Breedlove 40736* (DS) as *C. tomentosa.* Both of these collections represent the southernmost records for their respective species.

Cheilanthes mickelii T. Reeves, Brittonia 32:502, figs. 1–5. 1980. This new species has as type a specimen from Mexico, Edo. Oaxaca, Dto. Yautepec, 64 km w of Tehuantepec on Rte. 190, *Mickel 4210* (NY). The two paratypes that Reeves cited from Chiapas (*Breedlove 30592, 36744*) are treated on p. 157 of this work as belonging to *Notholaena cinnamomea* [≡*Cheilanthes tryonii* T. Reeves, Brittonia 32:504. 1980], which according to Reeves (in litt.) is confined to Guatemala and Honduras (*Molina R. 14337,* US). *Cheilanthes mickelii* and *C. tryonii* are very close relatives, resembling each other "in shape, size and degree of dissection of the blade, in the moderate degree of modification of the indusial margin of the segments, in the slender, short-creeping rhizomes and bicolored rhizome scales, and in the presence of narrow scales on the stipe, rachis and blade" (Reeves, 1980b). *Cheilanthes mickelii* is said by Reeves to differ from *C. tryonii* "in its sulcate or flattened stipe and sulcate (rather than terete) rachis, in the entire (rather than long-dentate) scales on the stipe, rachis and pinnae rachises, and in the simple (rather than branched) hair-like scales on the surface of the segments. The indument of *C. mickelii* is also less dense than in *C. tryonii.*" According to Reeves, both species are related to such species as *C. microphylla* and *C. cucullans* Fée.

Cnemidaria decurrens (Liebm.) Tryon — p. 76

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Ctenitis melanosticta (Kunze) Copel. — p. 81

Also Edo. Tabasco: *Cowan 2903* (Cowan, 1980).

Ctenitis salvinii (Baker) Stolze — p. 83

Also reported, as *C. lindenii,* from Edo. Veracruz (Riba & Pérez-García, 1979).

Danaea elliptica J. E. Smith — p. 88

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Dennstaedtia Bernh. — p. 89

Tryon (1980) proposed conservation of the genus *Dennstaedtia* T. Moore (Ind. Fil. xcii. 1859), with conserved type *D. cicutaria* (Sw.) Moore, against *Dennstaedtia* Bernh. (1801). This proposal was prompted by the finding that spores of *Dennstaedtia* (in the usual sense) are prominently verrucate-tuberculate, reticulate, or ridged, while spores of *Microlepia,* a primarily Old World genus, are delicately echinate. The type of *Dennstaedtia* Bernh. (*D. flaccida*) has echinate spores and so belongs in *Microlepia* (in the usual sense). Thus, unless Tryon's proposal is adopted, the name for *Dennstaedtia* in the usual sense (and for all Chiapas species herein treated in *Dennstaedtia*) would become *Sitobolium* Desv., while *Microlepia* would become a synonym of *Dennstaedtia* Bernh.

Dennstaedtia obtusifolia (Willd.) Moore — p. 91

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Dicranopteris flexuosa (Schrader) Underw. — p. 93

Also Edo. Tabasco: *Cowan 1533* (Cowan, 1980).

Dictyoxiphium Hook. — p. 93

Tryon and Tryon (1981) transferred the lone species in *Dictyoxiphium,* as well as species of three other tectarioid genera, to *Tectaria*: *Tectaria panamensis* (Hook.) R. & A. Tryon [basionym: *Dictyoxiphium panamense* Hook.].

Dictyoxiphium panamense Hook. — p. 93

Also Edo. Veracruz (Riba & Pérez-García, 1979). Wagner et al. (1978) have convincingly demonstrated the participation of *Dictyoxiphium panamense* in hybridization with *Tectaria incisa* Cav. to produce *Pleuroderris michleriana* (D. C. Eaton) Maxon. Since both parents occur in Chiapas and perhaps grow together, there is the potential for hybridization. Wagner et al. counted $2n = 80$ for *Dictyoxiphium,* $2n = 40$ II for *Tectaria incisa,* and $2n = 80$ for *Pleuroderris,* with the last-named showing 15 to 35 II plus I at meiosis.

Diplazium lonchophyllum Kunze — p. 97

Also Edo. Tabasco, e.g., *Cowan et al. 3162* (Cowan, 1980).

Diplazium striatum (L.) Presl — p. 98

Lellinger (1978) recently described *Diplazium striatastrum,* a segregate from *D. striatum.* These two are said to differ in the lower pinnae of *D. striatastrum* being "quite uniform in width and division from the base of the blade to near the apex, whereas the basal pinnae of *D. striatum* are wider and more dissected (fully pinnate) than the median and subapical pinnae." Also, the rhizome scales of *D. striatastrum* have "rather straight walls" (sinuous walls in *D. striatum*). *Diplazium striatastrum* ranges from southern Mexico (Oax.) and Guatemala, through Central America, to Venezuela and Ecuador; this is apparently only a small portion of the range of *D. striatum.* Both species may well occur in Chiapas, but I have not been able to evaluate their stated differences.

Doryopteris J. Smith — p. 100

Doryopteris has been proposed for conservation against *Casseberra* Kaulf. (Tryon, 1979); this proposal has been voted upon favorably by the Committee for Pteridophyta (Pichi Sermolli, 1981).

Doryopteris concolor (Langsd. & Fisch.) Kuhn — p. 101

Tryon and Tryon (1981) removed this species from *Doryopteris* and placed it in *Cheilanthes* [*C. concolor* (Langsd. & Fisch.) R. & A. Tryon]. See comments in Addendum under *Cheilanthes.*

Dryopteris parallelogramma (Kunze) Alston — p. 102

Reexamination of specimens and correspondence with C. R. Fraser-Jenkins convince me that *Dryopteris parallelogramma* is not sufficiently distinguishable from the Old World *D. wallichiana* (Spreng.) Hyl., which is the older name. Fraser-Jenkins (1980) attempted to apply the name *D. paleacea* (Sw.) Hand.-Mazz. to the aggregate species, but this can be rejected on grounds that Handel-Mazzetti was really renaming the later homonym *Aspidium paleaceum* Don (1825), not *Aspidium paleaceum* Swartz (1806); thus, the combination *Dryopteris paleacea* (Sw.) C. Chr. (1911) becomes a later homonym of *D. paleacea* Hand.-Mazz. (1908) (Smith & Fraser-Jenkins, ms. submitted for publication).

Elaphoglossum Schott ex J. Smith — p. 104

Mickel (1979, 1980b) recently described 12 new species of *Elaphoglossum,* 3 from Guatemala and 9 from Mexico. Only one of these (*E. alan-smithii* Mickel) is presently known from Chiapas, the others occurring in Guatemala (3 spp., 1 endemic), Oaxaca (7 spp., 4 endemic), Guerrero, Michoacán, Jalisco, Veracruz, and Hidalgo. It is likely that some of these will eventually be found in Chiapas. See also note in Addendum under *Peltapteris.*

Gymnopteris rufa (L.) Bernh. ex Underw. — p. 126

Also Edo. Tabasco, e.g., *Matuda 3415* (Cowan, 1980).

Lygodium venustum Swartz — p. 145

Also Edo. Tabasco, e.g., *Cowan et al. 1673* (Cowan, 1980).

Microgramma nitida (J. Smith) A. R. Smith — p. 149

Proctor (1980) reported this species as occurring in Jamaica and Barbados.

Nephrolepis exaltata (L.) Schott — p. 152

For additional discussion of typification, see Tryon (1968) and reference cited therein.

Notholaena R. Br. — p. 155

See comments in Addendum under *Cheilanthes.* For additional comments on typification, see Pichi Sermolli (1981).

Notholaena aurea (Poir.) Desv. — p. 156

See comments in Addendum under *Cheilanthes.*

Notholaena brachypus (Kunze) J. Smith — p. 156

See comments in Addendum under *Cheilanthes.*

Notholaena cinnamomea Baker — p. 157

See comments in Addendum under *Cheilanthes.*

Notholaena sinuata (Lag. ex Swartz) Kaulf. — p. 158

See comments in Addendum under *Cheilanthes.*

Osmunda cinnamomea L. — p. 162

Also Edo. Tabasco: *West & Barlow 33/4* (Cowan, 1980).

Osmunda regalis L. — p. 162

Also Edo. Tabasco: *Cowan 3100* (Cowan, 1980).

Pellaea seemannii Hook. — p. 164

See comments in Addendum under *Cheilanthes.*

Pellaea skinneri Hook. — p. 165

See comments in Addendum under *Cheilanthes.*

Peltapteris Link — p. 165

Mickel (1980a) provided convincing evidence for treating *Peltapteris* as a subgroup of *Elaphoglossum.* His evidence derives primarily from a study of rhizome habit, scales, and spore morphology of the two genera. Spores of *Peltapteris peltata* are said by Mickel to be "identical" to spores of *Elaphoglossum squamipes* (Hook.) Moore, and the two species have very similar rhizome habit and scales. Mickel placed both species in *Elaphoglossum* sect. *Squamipedia,* with *Peltapteris* ranking only as a subsection. The correct name for the sole species of *Peltapteris* in Chiapas is then *Elaphoglossum peltatum* (Swartz) Urban, Symb. Antill. 4:60. 1903.

Plecosorus Fée — p. 173

Tryon and Tryon (1981) treated *Plecosorus* as a synonym of *Polystichum.*

Pleopeltis percussa (Cav.) Hook. & Grev. — p. 176

Recently reported, as *Polypodium percussum,* from Edo. Veracruz (Riba & Pérez-García, 1979). Also Edo. Tabasco: *Matuda 3572* (Cowan, 1980).

Polypodium polypodioides (L.) Watt — p. 191

Also Edo. Tabasco: *Matuda 3572* (Cowan, 1980).

Polypodium rhachypterygium Liebm. — p. 193

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Pteridium aquilinum (L.) Kuhn — p. 201

Also Edo. Tabasco, e.g., *Guizar M. 502* (Cowan, 1980).

Pteris orizabae Mart. & Gal. — p. 205

Tryon (1964) showed that *Pteris polita* Link (holotype at B; "isotypes" at HBG apparently represent a different species) is a synonym of *P. deflexa* Link, a free-veined species. This opinion is at variance with that of Morton (1967). *Pteris propinqua* J. G. Agardh and *P. orizabae,* both with costal areoles, are more closely related to each other, and their differences, if any, need investigation. *Pteris propinqua* is the older name.

Pteris pungens Willd. — p. 206

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Selaginella stellata Spring — p. 266

Also Edo. Tabasco: *Calzada 4943* (Cowan, 1980).

Sphenomeris Maxon — p. 210

Tryon and Tryon (1981) treated *Sphenomeris* as a synonym of *Odontosoria.*

Sticherus bifidus (Willd.) Ching — p. 211

Also Edo. Tabasco: *Cowan 3171* (Cowan, 1980).

Tectaria incisa Cav. — p. 215

Also Edo. Tabasco: *Cowan 3158* (Cowan, 1980). Hybridization may occur between *T. incisa* and *Dictyoxiphium panamense* (see note in Addendum).

Thelypteris resiliens (Maxon) A. R. Smith — p. 233

Also Edo. Tabasco: *Cowan 2905* (Cowan, 1980).

Thelypteris torresiana (Gaud.) Alston — p. 234

Also Edo. Tabasco: *Cowan 1723* (Cowan, 1980).

Trichomanes L. — p. 239

For additional discussion of typification, see Pichi Sermolli (1981).

Trichomanes collariatum v. d. Bosch — p. 241

Also Edo. Veracruz (Riba & Pérez-García, 1979).

Trichomanes ovale (Fourn.) W. Boer — p. 243

Also Edo. Tabasco: *Cowan 3141* (Cowan, 1980).

References for Addendum

Cowan, C. 1980. Lista preliminar de especies de la Flora de Tabasco. Unpubl. ms.

Fraser-Jenkins, C. R. 1980. Nomenclatural notes on *Dryopteris*: 4. Taxon 29:607–612.

Lellinger, D. B. 1978. Río Palenque fern notes. Selbyana 2:283–285.

Lloyd, R. M. 1980. Reproductive biology and gametophyte morphology of New World populations of *Acrostichum aureum.* Amer. Fern J. 70:99–110.

Mickel, J. T. 1979. Three new Elaphoglossums from Guatemala. Amer. Fern J. 69:100–102.

———. 1980a. Relationships of the dissected elaphoglossoid ferns. Brittonia 32:109–117.

———. 1980b. Nine new Elaphoglossums (Elaphoglossaceae) from Mexico. Brittonia 32:334–339.

Morton, C. V. 1967. Studies of fern types, I. Contr. U.S. Natl. Herb. 38:29–83.

Pichi Sermolli, R. E. G. 1981. Report of the Committee for Pteridophyta. Taxon 30:161–163.

Proctor, G. R. 1980. Supplemental notes on Lesser Antillean pteridophytes. Amer. Fern J. 70:88–90.

Reeves, T. 1980a. The genus *Cheilanthes* Sw. (nom. cons.) in the United States. Unpubl.; mimeograph distributed with talk presented at Vancouver, B.C., July 1980.

———. 1980b. *Cheilanthes mickelii* (Adiantaceae), a new species from southern Mexico. Brittonia 32:502–504.

Riba, R., and B. Pérez-García. 1979. Estudio botánico y ecológico de la región del Río Uxpanapa, Veracruz. No. 9. Pteridofitas. Biotica 4:135–139.

Tryon, R. 1964. The ferns of Peru, Polypodiaceae (Dennstaedtieae to Oleandreae). Contr. Gray Herb. 194:1–253.

———. 1968. Nomenclature proposals to the Seattle Congress. Proposal 157. Taxon 17:588–589.

———. 1979. Proposal to conserve *Doryopteris* J. Smith. Taxon 28:609.

———. 1980. Proposal to conserve the name *Dennstaedtia* T. Moore (1859). Taxon 29:512–513.

——— & A. Tryon. 1981. Taxonomic and nomenclatural notes on ferns. Rhodora 83:133–137.

Wagner, W. H., Jr., F. S. Wagner, and L. D. Gómez P. 1978. The singular origin of a Central American fern, *Pleuroderris michleriana*. Biotropica 10:254–264.

INDEX

This index contains names of all genera and species listed in text and Addendum (abbreviated "A" in Index) but excludes page references to names in keys and references. **Boldface** roman type indicates names of accepted genera and subdivisions of genera; lightface roman type denotes accepted species names. All synonyms (generic and specific) are in *italic* type. An asterisk (*) indicates a taxon illustrated herein. If multiple page numbers are given for a particular taxon, the first number listed is the primary reference.

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